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Tiger in its home

Photo by : A.S.Negi



The Panchachuli Range

Photo by A.S. Negi



A View of Pancheshwar

Photo by A.S. Negi

Editorial

Another quarterly issue of Cheetal is with you once again on time. I am also very happy to inform our readers that the office of the Wildlife Preservation Society of India situated at 7 Astle Hall Dehradun, which was lying in a dilapidated condition since long, has since been renovated & a new look has been given to it. Encouraged by the central location of the Society's building we are stipulating to make it "A Center of Excellence" for Wildlife know how. The status of Dehradun city having been raised to the State Capital City, the need for such a Centre has been felt after creation of the new State. The presence of Wildlife Institute of India (WII), Indian council of Forestry Research & Education (ICFRE), Indira Gandhi National Forest Academy (IGNFA) is the added advantage to draw support for such a Centre.

The Society has a rich collection of books & the office building has enough space to facilitate members to read the books or make notes for their projects, research work and other assignments. We are keen to generate interest in reading Wildlife related books, specially in the younger generation.

Bringing awareness about conservation issues has become a urgent need of the hour. Looking at the scenario of fast disappearance of various species of flora & fauna, unless every person having concern for conservation issues, comes to the rescue of nature, we may become miserably poor in our treasures of biodiversity and face serious blame from our coming generation. Many species of flora & fauna are getting extinct even before they are discovered. India has a rich biodiversity due to its location at the trijunction of Palearctic, Afrotropical & Indomalayan biogeographical realms. India harbours 394 species of mammals, 1228 species of birds, 2446 species of fishes, 210 species of amphibians, 496 species of reptiles & over 57,525 species of insects, butterflies & other lower order organisms.

In India 78 species of mammals, 40 species of birds, 23 species of amphibians & reptiles & 131 species of insects are vulnerable and if not protected in time will become endangered. IUCN has prepared a list of 140 plant species in India which are at the verge of extinction due to uncontrolled trade, environmental degradation & misuse and overuse of natural resources. Scientists have warned that during next 25 years we may be losing one species of fauna in every 15 minutes. Should we allow our own existence to be extinct along with other species like that of the Dinosaur or shall we use our intelligence to ensure our own existence. Let us allow the free play of nature without creating hurdles & difficulties in its way to evolve freely.

A.S. NEGI.

Acknowledgement

The Wildlife Preservation Society of India, Dehradun puts its deep appreciation on record for Sri Ravi Singh Secretary General & CEO, WWF - India, in particular & WWF - India in general, for giving financial help & moral support for bringing out the long awaited issues of our popular quarterly journal "Cheetal". It is because of the financial & moral commitment offered by Mr. Ravi Singh in the Executive Committee meeting of 24th Nov. 2005 that the last issue of Cheetal (Vol 42, Nos 3&4) could be circulated to our readers in April 06 & this issue has been brought out in time. I am sure the backlog of the Cheetal issues will be completed soon. WWF - India has donated Rs.50,000/- for this cause out of which Rs. 25000/- has already been advanced to the Society in Jan 06. They have also committed a financial support of Rs. One lac for rediscovering the mountain quail (*Ophrys superciliosa*) out of which an amount of Rs.25000/- has already been advanced to the Society in Jan 06. The Society is making efforts in collaboration with Wild life Institute of India & State Forest Department of Uttaranchal to take up the project. The Editorial Board of Cheetal & Executive Committee of Wildlife Preservation Society of India is deeply indebted to Sri Ravi Singh SG & CEO WWF -India for his timely help for rejuvenation of the Society, which is one of the oldest of its kind in North India.

WWF - India is a pioneer voluntary organisation of the country whose mission is "The promotion of nature conservation & environmental protection as the basis for sustainable and equitable development".

A profile of WWF -India is separately given in this issue for better understanding among our readers.

A.S. Negi.

WWF-INDIA-A PROFILE

INTRODUCTION TO World Wide Fund for Nature-India

WWF-India is engaged in a multitude of activities for protection and conservation of the environment in the Indian context. Climate Change and Energy Conservation are among the chief areas of concern for the organisation. The Forest and Biodiversity Conservation Division strives to promote and enhance conservation of forest ecosystems in the country through a participatory approach involving key stakeholders. Through its Environment Education Programme, it aims at strengthening individual and institutional capacity in nature conservation and environmental protection through widespread education and awareness.

Intimately involved in the conservation of tigers in India since the late 1960s, WWF's significant efforts culminated in the launch of Project Tiger in 1973. It seeks to conserve and protect the biodiversity of maritime life and resources by sensitising the people at large. The pollution of the river waters and the imminent threat to aquatic life is a cause of great concern. WWF-India has stepped in on a number of occasions to launch campaigns for securing their habitat, like 'Save the River Dolphin' project. WWF believes that if you secure an animal's habitat, you secure its right to live.

WWF's broad areas of focus are:

1. Climate Change
2. Education
3. Environmental law
4. Forests and Biodiversity
5. Freshwater and Wetlands
6. Conservation and Monitoring
7. Oceans and Coasts
8. Tiger and Wildlife

WWF has a global presence in over 90 countries worldwide, with the coordinating body, WWF International, located at Gland in Switzerland. A specialist office in Brussels works on the policies and

activities of the European Union, while a second office in Washington DC, works with global institutions involved in international economic issues, such as the World Bank.

WWF India is part of the WWF family, an autonomous office, with the Secretariat based in New Delhi. We operate at the state level through our Divisional offices in 33 states, reaching out to the grassroots through our various Project Offices.

Its work extends through the length and breadth of the country, be it in the far reaches of the Himalayan region, the arid deserts in the west, the swampy grasslands in the east or the coastal belts flanking the country.

WWF-India is the largest organisation engaged in wildlife and nature conservation in the country.

Established as a Charitable Trust in 1969, it has an experience of over three decades in the field. With modest beginnings, the organisation was propelled forward by the efforts of its founders and associates who volunteered their time and energy to lend momentum to this movement.

A part of WWF International, the organisation has made its presence felt through a sustained effort not only towards nature and wildlife conservation, but sensitising people by creating awareness through capacity building and enviro-legal activism.

A challenging, constructive, science-based organisation WWF addresses issues like the survival of species and habitats, climate change and environmental education.

WWF-India's Mission

Historically, WWF-India started as a wildlife conservation organisation with a focus on protecting a particular species of wild flora and fauna. Over the years, the perspective broadened to reflect a more holistic understanding of conservation issues facing the country.

To suit India's specific ecological and socio-cultural situation, WWF-India articulated its mission in 1987 as follows:

"The promotion of nature conservation and environmental protection as the basis for sustainable and equitable development."

The WWF-India mission has five broad programme

components:

- * Promoting India's ecological security; restoring the ecological balance.
- * Conserving biological diversity
- * Ensuring sustainable use of the natural resource base.
- * Minimising pollution and wasteful consumption promoting sustainable lifestyles.
- * WWF-India implements its conservation programmes through the following methods: field programmes, public policy, education, communications, NGO networking and resource mobilisation.

The WWF-India has been working to promote harmony between human beings and nature for more than three decades.

Today, it is recognized as a premier conservation NGO in the country dealing with nature conservation, environmental protection and development-related issues. At a time when the Web of Life has come under increasing threats, WWF-India's attempts have been to find and implement solutions so that human beings can live in harmony with nature, and leave for future generations a world rich in natural resources and natural wonders.

WWF-India was established as a Charitable Trust in 1969. With its network of State/Divisional and Field Offices spread across the country to implement its programmes, WWF-India is the largest and one of the most experienced conservation organizations in the country. The Secretariat functions from New Delhi.

The organization is part of the WWF-family with 27 independent national organisations. The coordinating body, the WWF International, is located at Gland in Switzerland.

पहाड़ी बटेर (माउन्टेन क्वेल) खोज अभियान



मादा →

नर

स्थानीय नाम	:	पहाड़ी बटेर
अंग्रेजी नाम	:	माउन्टेन क्वेल (Mountain Quail) हिमालयन क्वेल (Himalayan Quail)
वैज्ञानिक नाम	:	ओफरायसिया सुपरसिलियोसा (<i>Ophrysia superciliosa</i>)
फैमिली	:	फासियानिडियेई (Phasianidae)
आकार	:	बटेर तथा तीतर के मध्य का आकार

नर :- स्लेटी भूरा रंग का होता है तथा नीचे का रंग कालापन लिये हुये होता है, आंखों तथा कानों के ऊपर काले धब्बे पाये जाते हैं। गर्दन व चेहरा काला होता है, चोंच और पंजे लाल रंग के होते हैं।

मादा :- ऊपरी भाग भूरे रंग का होता है तथा नीचे का रंग धुंधला होता है तथा काले धब्बे तथा धारियां होती हैं। चेहरा हल्का गुलाबी भूरा होता है। चोंच और पंजे हल्के लाल रंग के होते हैं।

आवाज :- कर्कश तेज व कर्णभेदी सीटी की आवाज की तरह।

यह पक्षी प्रजाति 1876 में अन्तिम बार देखा गया है तथा विलुप्त माना जा रहा है। सामान्यतया यह पश्चिमी हिमायल के 2000 से 2500 मीटर ऊँचाई के क्षेत्रों में पाया जाता है। उत्तरांचल में यह प्रजाति मसूरी तथा नैनीताल के समीप के क्षेत्रों में पायी जाती है। यह तीव्र ढाल वाली पहाड़ियों में लम्बी घास तथा झाड़ियों में 5 व 6 के छोटे समूह में विचरण करते हैं। इनके पास पहुँचने से ये छोटी तथा लम्बी उड़ान भर कर उड़कर पुनः घास व झाड़ियों में छिप जाते हैं। इसको पुनः खोजने के कई प्रयास किये गये हैं परन्तु कोई सफलता नहीं मिली है। जिस किसी व्यक्ति को उक्त पक्षी दिखायी देता है वह इसकी जाकारी निदेशक, राजाजी राष्ट्रीय पार्क एवं मुख्य वन्य जीव प्रतिपालक, उत्तरांचल को देकर जानकारी की पुष्टि होने पर समुचित इनाम का हकदार होगा।

मसूरी वन्यजीव विहार

राजाजी राष्ट्रीय पार्क, देहरादून

5/1, अंसारी रोड, देहरादून

दूरभाष : 0135-2621669

Important Notice to our Readers, Members and Contributors of Articles for Cheetal

1. The annual subscription to be paid by annual members falls due on 1st April of current financial year. Many of our annual members have not paid their subscription for past few years despite repeated requests. Due to apathy of such members the Society is facing great financial hardship. This may kindly be treated as an urgent notice for requesting members to pay the pending dues. this is your society & can run only with your support & sympathy. Members are earnestly requested to clear their outstanding dues even if they have to do it in installments.
2. Members & subscribers are also earnestly requested that in addition to annual subsiptions, voluntary DONATIONS may be made to help the society to tide over its financial crisis.
3. Many of our regular contributors of articlcs have stopped contributing for Cheetal which is a matter of concern for the Society. Members & contributors of articlcs are requested to send their articles along with a soft copy (if possible) to make the Journal more meaningful. Members are also requested to motivate & encourage their friends, acquaintances & family members to contribute useful articles for Cheetal including articles for Young Readers Section, Cheetal quarterly news and your views about the magezin or any particular article or suggestions for improvement. Any old Cheetal article of current relevance may also be suggested.

A.S. Negi

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THE MAN-EATING LEOPARD OF UTTARKASHI

A.S. Negi IFS (Retd.)

Man-eating by leopards has been a major problem in some hilly districts of Uttarakhand particularly since early nineties. This has been a matter of serious concern for Forest Department, politicians, conservationists, scientists and the local people. Wildlife Institute of India has been working on a project to study this problem in the most affected areas of Pauri-Garhwal district since last three years but nothing concrete could be achieved. Though major areas of district Pauri-Garhwal are most affected but cases from districts Tehri, Almora, Nainital and Champawat are also coming to light regularly. On an average 40 to 50 human beings mostly children and women are killed and 60 to 70 injured every year by leopards in this tiny Himalayan State of about 8 million people. Most alarming situation is the increase in man-eating cases year after year without any solution in sight. One major concern of the conservationists is about the long term existence of this already endangered cat due to apathy of local people and unscientific and ad hoc handling of active man-eaters by district administration under local and political pressure.

Uttarkashi district has been the least affected district due to large forest area with good prey base. More than 85% of the geographical area of the district is under forest most of which has good density. 45.5% of the total P.A. network of the State falls in this district, which accounts for 41.7% of the forest area of the district. Out of 6 NPs & 6 WLSs

situated in the State two NPs & one WLS is in this district

Raridanda is a densely forested hill in Uttarkashi district, separating watersheds of Ganga and Yamuna rivers. A drop of rain falling over this hill, if gets divided to fall on either side of this hill, has a imaginary chance to meet only at Allahabad, the confluence of these rivers, some 600 kms away. An old Forest Rest House, Silkyara is situated near the base of this hill in Ganga catchments in the beautiful setting of Chirpine forests. On the fateful night of Dec. 16, 2003, Seema a six year old girl of village Mehargaon, a small hamlet about 2 km. away from Silkyara FRH, was lifted by a leopard at around 6.30 pm from her courtyard and carried to a spot about 200 m. down hill. The villagers searched for the girl till late night but could discover the partly eaten corpses of the girl only next morning. The beast could eat only one leg of the girl due to disturbance of the shouting search parties. The Forest Department acting on information reached the spot early next day and after due formalities posted armed Forest Guards in the village to give them confidence and to ensure that due precautions are taken by the villagers in and around the area.

Divisional Forest Officer Uttarkashi who is responsible to handle such cases in the district, reported the matter to the Chief Wildlife Warden of the State at Dehra Dun and after necessary enquiries and satisfying himself that the animal is likely to cause more loss to human life in the area, recommended

for declaring the leopard as man-eater under provisions of Wildlife Protection Act and authorizing suitable hunters to eliminate the dangerous beast.

After five days on 22nd Dec.2003 the leopard struck in village Kumrara, about 5km. away from the previous spot near road side town of Brahamkhal, at around the same time in the evening and pounced on a Nepali boy aged 11 years who managed to escape injured, as the animal did not succeed to kill him. With in minutes he pounced on another boy Satvir aged 5 years and seriously injured him but could not take him away due to shouting by villagers. The boy succumbed to his injuries on way to hospital.

The above incidents not only confirmed that the beast had turned to be a dreaded man-eater but also indicated some physical disability in him. Local people demanded immediate liquidation of the leopard and demonstrated by putting road blocks on Gangotri & Yamnotri roads. This has become a common practice these days to attract the attention of the Administration without realizing that this causes inconvenience only to their local friends and relatives.

The leopard was declared as man-eater by the Chief Wildlife Warden Uttarakhand under Wildlife Protection Act and some reputed shooters were also authorized to eliminate the beast. Simultaneously C.W.L.W also authorized D.F.O. Uttarkashi to trap him dead or alive in the cage. The first shooter to report was Mr Lakhpat Singh a Intermediate school teacher from district Chamoli. Mr Singh has a reputation of eliminating man-eaters including the man-eating leopard of Adibadri in district Chamoli who operated for eight months and killed 5 people and injured 3. Mr.

Singh continuously stayed in the affected area till he succeeded in killing the beast. He is also reputed for taking all precautions to identify the man-eater before eliminating the same. A team of hunters from Pauri also reported who has at their credit a large number of leopards hunted by them in and around Pauri. Once Dr A.J.T. Johnsingh of Wildlife Institute of India happened to inspect skins of leopards stored in the Range Office Pauri with me. We found to our utter surprise that over sixty percent of the skins were those of juveniles and cubs. An interview with some of the authorized hunters and local people revealed that the public pressure through demonstrations, *Dharnas & Gheraos* compelled the district administration to get the services of these local hunters immediately, who managed to hunt any leopard at night by patrolling the roads on open jeeps, in the process injuring several others and further compounding the man-eating problem. The ignorant public would take the hunted leopard in procession and garland the hunters and give them public receptions without realizing that the problem animal is still at large. The man-eaters generally have large areas of operation and any subsequent kill would be assumed to have been made by another man-eater and further pressure would be put on Forest Officers to get the same declared as another man-eater. A careful analysis of the data regarding leopards hunted and human beings killed in and around Pauri, maintained in the office of D.F.O. Garhwal will support this view.

The leopard struck again on 29th Dec. at around 6.30 pm at a lonely roadside house near Dunda town, about 25 km by road from previous spot, injuring two children, Manisha, a 5 yr old girl and Amar Singh, a 8 yr. old

boy but not succeeding in killing or lifting any of them. This was the third incident within two weeks, enough to cause worries for the administration and panic among the local residents. Though the last spot was 25 km. from the previous one by road but both the spots were situated on either side of a hill not more than 5 km. apart through shortest distance. The level of disturbance at two previous spots had made him more clever to make him switchover to another valley. The beast was a daring devil to pounce on the playing children close to a busy market full of street lights. His inability to feed on any of the kills made him desperate to strike at such short intervals. The fact that the beast was unable to kill his natural prey due to old age or disability also became clear. The hunters, especially Mr. Lakshpat Singh made their strategy to nab the leopard accordingly. Just after a week, on 5th of Jan. 2004 the leopard made yet another attempt in village Panchangaon on the other bank of river Bhagirathi. Sajan Singh a 5 yr old boy and his aunt were together lifting a small wooden pole outside their house situated in the middle of a row of houses in the village at around 6 pm, when the leopard pounced upon the boy and virtually tried to snatch him from his aunt. Due to hue and cry made by the woman and gathering of people from nearby houses the leopard left the boy seriously injuring him. The boy succumbed to his injuries on way to hospital. This time the leopard had chosen a village on the other side of river Bhagirathi more than 10 km. from the last place of attack by shortest distance. The intervening area between the last two spots has a good forest cover and there is hardly any activity in these forests during winters. The leopard had full

opportunity to walk even during daytime. The hunters immediately changed their location and sat at different locations during night with the hope to nab the beast. The hunters party from Pauri became restless and even went to the extent of suggesting to the local Forest Ranger that they can release the immediate pressure by killing any leopard in the area, which was strongly objected by the F.R. This party then left the area and went back. Knowing their intentions D.F.O. Uttarkashi did not insist on their staying back in the affected area. Mr. Lakshpat Singh however continued his efforts with the same zeal.

The above incidents made the local Forest Administration and even the District Administration tense. There were speculations that more than one leopard are operating. Conservator of Forests, Bhagirathi Circle, Mr. Rajiv Bharghari visited the affected area and assessed the situation. The seriousness at the Govt. level was also increasing. Mr. Bharghari rang me up requesting my presence in the affected area at the earliest possible to give directions and guidance to local officers and the hunters and to assess the situation. D.F.O. Uttarkashi had made elaborate arrangements to infuse confidence among the people of affected areas by personally taking rounds of the area, posting armed Forest Guards in good numbers, putting A.C.F. as overall in charge of the operation, making regular announcements in the affected area regarding safety precautions to be followed by the villagers and closely liaising with district administration. D.F.O. Mr Kapil Joshi had contacted yet another team of hunters from Moradabad, Bulandshahar & Bijnaur who had promised to report on 11th of Jan. 04. I had known this team of young & enthusiastic boys

for the last one year and they had successfully eliminated some notorious man-eaters in Haridwar and Pokhal areas after correct identification. I too contacted the team on phone to confirm their program.

On 8th Jan. 04 Jyoti, a six year old girl of village Thalan, situated on either side of Uttarkashi-Chowrangi road came out of her small cooking room holding her mother's hand, to answer nature's call at around 6.30 pm when the leopard pounced on her from behind the house snatching and carrying the frail child in his mouth through the barren fields on the down hill side. There is a small roadside market close to this house with streetlights and usual evening activities still going on. On hearing the screams of the mother people from the market & other villagers gathered with torches & *Mashals* and followed the blood trail for some distance but were not able to locate the girl in spite of their efforts till around 11.00 pm. Immediately after the incident, message was sent to DFO at Uttarkashi who rushed the team of hunters and Forest field staff to the spot. The team searched the area in the wee hours of next morning but could not locate the remains of the child till it was dark. Mr. Lakhpatt Singh hunter and one of his companions sighted the leopard from a distance in the moon lit night while the beast was trying to sneak from behind a large rock. Leaving his quarry more than 50 meters down hill side, this extra cautious animal had come to this rock, located at a vantage point to mislead the search party and to assess the danger posed to him by them. The leopard then walked away through open fields in the full view of the search party keeping safe distance from the range of the gun. Mr. Singh could however get an opportunity, for the first time to identify the man-eater, a good-sized

old male with dark brown coat and some baldness on the forehead. The search partly could locate the partly eaten corpses of the child in the morning. The beast had eaten one leg and little portion of the skull leaving the remains in the open. Leopards even when they are man-eaters, cover the remains of their kill to hide its detection by other carnivores and vultures. This type of behavior could only be expected from a clever man-eater who did not intend to return to the kill sensing danger to his life.

The hunters & the forest field staff with the help of a sensible village *Pradhan* and other positive thinking villagers were able to persuade the parents of the unfortunate girl to leave the remains of the corpses at the site to take a chance to hunt the man-eater during coming night. Mr. Singh dug a trench at a suitable place for him to take position well before the fall of darkness without even slightly disturbing the remains of the corpse. The beast disappointed the hunter by not showing up & the arrangement had to be abandoned. The brave unfortunate family performed the last rights of the girl after postmortem etc.

I visited the affected area on 10th of Jan.04 with Sri Kapil Joshi, D.F.O. and his team. Mr Joshi briefed me about the happenings till that day, took me around the villages where the incidents had taken place and apprised me about steps taken in this connection. Same day Mr. Singh A.C.F. in Uttarkashi Forest Division informed me that on 7th Jan., when he along with other field staff were passing near Fold FRH, they heard loud shouts in the nearby village at around 6 pm. They rushed to the spot and were told by the villagers that only few minutes before a leopard tried to attack a small boy but could

not succeed due to timely alarm raised by family members. They sighted the animal while running away and described it as a large animal with dark brown color. We presumed that it might have been the same animal as this location was between the last two incidents of 5th and 8th Jan. Looking at the terrain in which the man-eater was operating, I had to tell Mr. Joshi that it might take some time before the man-eater could be killed or trapped. There was dense forest cover all around, valleys with habitation were separated from each other by large forest blocks and there were large number of isolated houses and small hamlets in every village.

At Thalan village we met the unfortunate mother of the last victim who had almost lost her mental balance and was trying to narrate the incident in the local folklore with lost eyes and dried tears. The village was then being used as a temporary HQr for the operation and was hardly 5 km away from district headquarter Uttarkashi as the crow flies. The villagers were panicky. A jeep taxi hired by the Forest Department, mounted with a loudspeaker was taking round in the area announcing the necessary precautions that the villagers were supposed to take at such a time. We met Mr. Lakshpat Singh hunter and tried to find out his strategy. He along with some Forest Guards had taken some pugmark tracings of the leopard and he was quite confident that he would identify the man-eater as he was able to see him near the last kill. We talked to the villagers and tried to pacify them. The village was abuzz with rumors, a wild cat approaching a dead cow near the village was being taken for the leopard. The nights in hills are quite silent and sounds are easily audible across the valleys. The cries of the relatives of

a seriously ill old woman were mistaken as mishap by the man-eater and the Forest team had to go all the way to the place about one km uphill at night to verify the facts.

Cages to trap the man-eater alive had been placed at Mehargaon(site of first incident) & Panchangaon(site of forth incident) and we decided to shift them to this valley and place them at suitable locations the next day. A puppy dog about three months old had been killed by a leopard two days after the last incident and Mr. Singh was to sit on a make shift *Machan* during the coming night. After spending some time at Thalan we returned to Kotbangla FRH at Uttarkashi late in the evening. While we were discussing the future course of action, Mr. Joshi received a phone call from some body, who would not reveal his identity, to send the hunter's party in his village telling that the leopard has been sighted in his village. From his wavering voice the caller appeared to be under the influence of intoxication. Before the DFO could verify the facts, yet another call came from Uttarkashi police station, where same caller had given false alarm, passing on the information to DFO for appropriate action. Immediate verification from the field proved that the call was hoax. Such distractions are not uncommon in situation of this kind and they have to be dealt with patiently and tactfully. We looked at a Survey of India map sheet of 1cm to 4km scale and marked all the places of man-eating incidents on it to convince the media and other concerned people that there was only one leopard operating in the area and try to find out for ourselves the pattern of strikes so far followed by the beast. After chalking out the strategy for the next day we retired to bed late in the night.

There was an information from the field next morning that a lamb had been lifted from a shepherd's camp close to a hamlet of Thalan village and the shepherd though had seen the leopard at around 7 pm close to his camp, could know about lifting of the lamb only the next morning. On an alarm being raised by the shepherd ACF Mr. Singh who was camping at Thalan went and interrogated him, who narrated how and where was the leopard seen by him. His description of the leopard resembled that of the man-eater. On hearing about my camping at Kotbangla, people from the media came to see me who were briefed and many of their misgivings were removed. District Magistrate Uttarkashi was also briefed about the sincere efforts being done by the Forest Department and the future strategy likely to be followed to eliminate the man-eater at the earliest possible. Local MLA Mr. Vijaipal Singh Sajwan had also reached the affected area who was also briefed by me personally. He had full faith on the capability and sincerity of the Department. We left for Thalan, the site of the last incident, in the afternoon and enquired about the incident of previous evening and supervised placing of cages at suitable locations.

The chances of sighting of the man-eater in the close vicinity of last man-eating site were remote. There could be another normal leopard in the area responsible for lifting puppy dog and the lamb. Leopard population in hills of Uttaranchal has been a subject of controversy and during census operations very conservative figures were being reported year after year. During my tenure as Chief Wildlife Warden of Uttaranchal, after detailed analysis a figure of over 1950 leopards was reported which was

difficult to be believed by the Ministry of Environment & Forests in GOI. I had to give facts & figures to prove my point that leopard population in hilly terrain of the State where the leopard is at the apex of the biological pyramid has to be very high specially because there is hardly any place including villages and towns where its presence is not felt as a cattle/dog lifter and sometimes even as a man-eater. The terrain of most of the Protected Areas in the State also favors high leopard population. Census of leopards in hilly terrain has always been difficult due to lack of visibility of pugmarks on hard stony ground and strict nocturnal behavior of the animal. The only way to estimate leopard population in such areas is therefore estimation of its territory based on availability of prey. The leopards prey on a wide range of living beings including pheasants, lizards, snakes, rats & mice, insects, beetles, cattle carcasses, street dogs, half burnt human bodies at burning *Ghats* near river banks, sheep goats and other domestic cattle and of course all the wild mammals found in hills. Of late there has been a drastic decline in his natural prey base, particularly outside P.As, due to unchecked poaching. Cattle population particularly that of sheep & goats has decreased and stall feeding and improved cattle breeds has made a perceptible difference in the quantity and availability of food for the leopard. Proper disposal of dead bodies particularly those of humans and decrease in death rate of domestic cattle has also contributed significantly in the food stress of the animal. During postmortem of a leopard killed by a wire trap near Harbartpur in Kalsi Forest Division, about three years back when the Hon'ble Forest Minister Uttaranchal Sri Nav Prabhat was also present, 6-7 plastic

pieces were found inside the stomach of the animal indicating the food stress that the animal has to face when he is forced to scavenge on bone pieces wrapped in plastic bags & thrown in towns and villages. Cover is another factor that plays an important role in determining the population of carnivores. In hills there is enough cover in and around towns and villages in the form of bushes, deep nullahs and ravines, rock crevices, caves, depressions and undulations, crop fields etc where leopards can easily hide without being disturbed during day time.

The authorized hunting party from Moradabad etc reached Uttarkashi on 11th late in the evening after a long journey. I could contact them on next morning, when they were briefed by me & DFO Sri Kapil Joshi. They were taken around the affected area, particularly the place of last incident. A brief meeting was held at the temporary operation Hqrs at Thalan between Mr Singh, the authorized hunter who was already in the area, myself, field staff of FD and the new hunting party, to chalk out strategy for earliest elimination of the man-eater. It was also decided that both the authorized hunting parties will work in close coordination with each other. The new party had a 2.5 million candle power searchlight and sophisticated weapons. As competent hunting parties had been placed in the affected area, I decided to return back to Dehra Dun on late afternoon of 12th Jan. 04, with the hope that there will be an early end of the man-eater.

I was keenly awaiting some good news, when a phone call from Mr Joshi DFO came at around 10 pm on 13th Jan. 04, informing me about shooting down of the man-eater by Mr. Lakhpatt Singh. The DFO rang me up

when he was already on his way to the place of incident. The details were available next morning. After traveling over 30km as the crow flies the leopard decided to return back in the direction of first two kills and struck in a village about 14km from the site of the last kill attacking and killing a 5 year old girl Babita, in village Margaon between 6 & 7pm. This tiny riverside village is located on opposite bank of Bhagirathi river. As the information of this incident reached the DFO he immediately rushed all the hunters to this site. The hunter Mr Lakhpatt Singh sighted the leopard close to the road at about 8 pm, and being confident of its identity as man-eater did not loose opportunity to shoot it. The beast was hit at shoulder and managed to run in the dark. It was not safe to trace it during dark hours. When the shooter returned to the site in the morning he found the injured leopard lying there and it was not difficult to put him down. It was a male leopard measuring 7 feet & 7 inches from the tip of the nose to the tip of the tail with its canines worn out. He had scratch marks on his fore head, presumably due to fight with another male quite some time back which made him look like bald. The animal was compelled to turn man-eater due to circumstances of being old, which incapacitated him to go for the natural prey. During his short span of less than a month as man-eater he cut short the life of five innocent children and injured another three besides creating panic among villagers and affecting their daily routine. The man-eater of Rudraprayag operated for over 8 years and killed over 125 people between 1918 & 1926 when it was finally eliminated by great hunter cum conservationist Jim Corbett. The fate of people living in that area can very well be

imagined who not only lost their kiths and kins but had to bear the agony of fear for such a long time

Several man-eaters have operated during last one and half decades killing score of children and women. The problem cannot be tackled single handed. Poaching of wild animals will have to be stopped, health of the

forest habitat needs to be maintained in prime condition, cases of man-eating leopards have to be tackled technically and with patience. The hill people will have to be more careful and cooperative during such crisis periods. Wildlife Institute of India will have to do some more serious research on this problem and State Forest Department would need more training and insight of the problem.



The end of the Uttarkashi Man-Eater

Photo by Kapil Joshi

GOLDEN MAHSEER CONSERVATION IN UTTARANCHAL

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Summary:

Golden mahseer is one of the splendid ecotourism species the Government of Uttarakhand should strive to conserve in order to enhance the prospects of nature tourism opportunities in the State. This stream-lined, yellow-finned and beautiful fish has several attributes which make it extremely vulnerable to extinction. In relation to body mass the fish produces less number of eggs than the commercially exploited species (e.g. rohu and catla), the eggs take longer time to hatch and the semiquiscent stage soon after hatching is much longer making it extremely vulnerable to predation. The fish needs clean streams from July to September for spawning and large and long rivers or reservoirs in the lower altitudes in the months of October to June for wintering, feeding and replenishing for the next breeding season. In Uttarakhand the golden mahseer is largely confined to lotic habitats (streams and rivers). The abundance of the fish over the decades has declined drastically as the fry, fingerlings and brooders are killed in the spawning streams by destructive ways of fishing such as dynamiting, poisoning and by the use of electricity. Further in three river systems (Yamuna, Ganga and Sharda) the fish has lost its feeding or wintering habitat as a result of hydel and irrigation projects. The loss of feeding or wintering habitat in Yamuna river is so severe that the future of the fish in the Yamuna drainage is bleak. Mahseer habitats in Ganga and Sharada rivers are further threatened by new hydel-power projects that are being planned. Ramganga drainage has immense potential for saving this species, as most of the drainage comes within Corbett Tiger Reserve but even here the fishes are killed when they ascend the streams for spawning. We come up with recommendations which would help saving the mahseer not only in Uttarakhand but all across the country.

In his quest for this fine fish the angler is taken into wild surroundings amidst some of the finest of nature's scenery. It may be that he will find his sport in the Himalayas, where is the grandest scenery in the world, and where the turbulent river winds its way through dark gorges clad in fir groves and rhododendrons with perhaps a glimpse at the head of the valley of the Eternal Snows....Macdonald, 1948.

Introduction:

The mountainous state of Uttarakhand, carved out of Uttar Pradesh on 9th November 2000, is immensely blessed with the bounties of Nature: lofty snow peaks, aesthetic bugyals or alpine meadows, imposing glaciers, scenic conifer forests, numerous rivers which offer opportunities for adventure sports like rafting

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and canoeing and *babhar* forests with abundance of wildlife including tiger (*Panthera tigris*) and elephant (*Elephas maximus*). All these can make Uttaranchal a great destination for nature tourists. The water bodies in Uttaranchal have many sport fishes such as the introduced rainbow trout (*Onchorynchus mykiss*), snow trout (*Schizothorax richardsonii*) found throughout Uttaranchal and S. kumawansis endemic to Kumaon), Indian trout (*Barilius bola*), goonch (*Bugarius bugarius*), black mahseer (*Tor chelynoides*), red-finned tor mahseer (*Tor tor*) and yellow-finned golden mahseer (*Tor putitora*). Among these one species which needs the immediate attention of the Government and which can significantly enhance the value of Uttaranchal as a destination for anglers is golden mahseer, the commonest of all mahseer. Fishing for mahseer, in a well-stocked submontane river, is the most fascinating of all forms of sport (Corbett 1944). Efforts to protect golden mahseer, which has the attributes of a flagship species (Simberloff 1998), would greatly improve the conservation status of other biota in the aquatic ecosystems in Uttaranchal.

Morphology and biology pertinent to conservation:

Golden mahseer is a fresh water carp belonging to the family *Cyprinidae* having a wide distribution occurring all along the foothills of Himalaya (Day 1878, jhingran 1983). It is one among the 11 species of mahseer that occur in Asia and one of the nine in India (Rainboth 1990). The recorded maximum size of golden mahseer is 2.74m. Hora (1939) gives the following diagnostic morphological features of golden mahseer. It has a streamlined, somewhat compressed (i.e.

flattened from side to side) body. Its head is longer than the depth of the body. The eyes are far forward and provided with circular pupils. Eyes are proportionately larger in the smaller individuals. The mouth is small, its gape does not extend to below the eyes, the lips are fleshy and there are two pairs of barbells. The body is covered with large scales (in the past, in some parts of India, the scales were used as playing cards, Lacy and Cretin 1895). There are 25-28 scales in a longitudinal series along the lateral line. The commencement of the dorsal fin is opposite to that of the pelvic, and is almost midway between the tip of the snout and the base of the caudal fin. The last spine of the dorsal fin is strong and bony. Dhu (1923) reports that there are 2½ scales between the base of the ventral fin and lateral line.

The fertilized eggs measure 2.8 to 3.2 mm and they take 58-192 hrs to hatch in water temperature of 16°C to 25°C (Sehgal 1991). This is comparable to the 18 hours for the catla (*Catla catla*) and rohu (*Labeo rohita*). The fecundity of mahseer as compared to the commercially exploited species is very low. For example the Deccan or khudree mahseer (*Tor khudree*) has 6000 eggs/kg body weight as compared to 2,61,000 eggs/kg body weight of rohu and 1,33,000 eggs/kg body weight of catla. The eggs of mahseer are demersal (capable of sinking in the mud) and therefore, if there is mud on the river bed instead of sand or gravel, they can sink and perish. Further the semiquiescent stage, soon after hatching, when they are highly vulnerable to all kinds of predation, is three days for catla and rohu and six days for khudree mahseer. All these make the mahseer extremely vulnerable to all forms of threats (Kulkarni and Ogale 1978).

The fry and fingerlings feed on diatoms, ciliates, rotifers, crustaceans and fish fry (Sehgal et al 1971). Hora and Mukherjee (1936) found golden mahseer having a shorter intestine indicating that it is much more carnivorous than the sympatric *Tor tor*. The fingerlings of golden mahseer are zoophagous (Pathani and Joshi 1979) and the adults more herbivorous (Das and Pathani 1978). Macdonald (1943) reports of mahseer waiting under bridges over the Ganges canal near Haridwar for young martins (scientific name???) to fall out of their nests. Males mature when they are two years old and attain a total length of ca. 200 mm and females mature when they reach a length of 300 mm around three years of age (Pathani 1983). Females (spawners) attain greater size than the males (milter) (MacDonald 1943).

Information on spawning is confusing. Thomas (1897) stated that the fish spawns thrice a year, once in winter (January-February), in May-June when the rivers are swollen with snow melt water and lastly from July to September when the rivers are flooded due to south-west monsoon. Sehgal et al (1971) founded on the collection of fertilized eggs and hatchlings from Baner stream in Himachal Pradesh reported that mahseer breed during May-June and August-September. Nautiyal and Lal (1984), based on their work in Ganges, record a triphased migration linked to food supply in nature: going up the main river (Alaknanda), getting into the spawning streams and returning back to the main river. The best possible information comes from Lal (1963), who supporting Beavan (1877), stated that mahseer ascend the rivers and hill-streams for breeding with the onset of rains from July to September. Hall further noted that

the fish were scarce and usually not available at lower altitudes during the above months implying that they all had gone up stream. Fish collected during the months of April, May and June were, on dissection, were found to possess ova in different stages of maturity which was dependent on the age of the fish. Mahseer caught during winter had undeveloped gonads. Lal was not able to collect any fish beyond Chamoli which is at an altitude of about 5500'. It can be concluded that the major spawning season coincides with the onset of rains which is from July to September. Fresh warm rain water coming in the streams may induce the growth and maturation of ova leading to the migration from the main river, which serves as a feeding and wintering habitat, for spawning. Since reproduction is biologically and physiologically expensive, particularly by females (Ref), individual fishes may not breed twice or thrice a year. It is possible that some individuals in a population may be induced to breed by the winter or summer rains. The presence of four groups of eggs of different sizes in females (Pathani 1983), however, indicate that during one breeding season some of the fishes may spawn four times. Interestingly mahseer do not die after spawning, as most salmon do (Reference), and they return to the main river in October.

Golden mahseer habitat in Uttarakhand:

The habitate, as anywhere else, is largely confined to the lotic habitats (streams and rivers). Lentic habitats (reservoirs and lakes) are a few (Fig. 1). The lakes in Kumaon Himalaya were stocked with golden mahseer by Sir H. Ramsay around 1858. The Bhimtal, the Nakuchiatal and the Sathtal were stocked with fingerlings transported in earthen vessels

from the Gola river and Nainital with those from Kosi river. The fish took well to the confined waters and bred in the shallow areas of the streams that drain into the lakes (Jones and Sarojini 1952). Now mahseer has become either extinct or rare in Nainital, Nakuchiatal and Sathtal and a Small population lingers in Bhimtal. Ramganga (Kalagarh) reservoir commissioned in 1976, across Ramganga river, has the best poputation of mahseer and goonch in Uttaranchal. Mahseer status in Nanaksagar should be a depleted one due to regular and intensive commercial fishing and uncontrolled fishing, including dynamiting, in Nandhour river which is the major spawning habitat of mahseer from Nanaksagar. Thumaria, Deoha and Dhora reservoirs have little or no mahseer.

The major lotic habitats are Sharda and its tributaries, Ramganga and its tributaries, Ganga and its tributaries and Yamuna and its tributaries. Existing literature clearly show that mahseer avoid snow fed rivers. Tons as big as Yamuna, a tributary but a snow fed river, holds hardly any mahseer and its place is taken over by snow trout. But the confluence of Tons and Yamuna was good where >50 lbs fishes were caught in the early part of 1960s (Honorary Secretary 1961). Keeper of the Inspection bungalow at Rudraprayag informed Corbett (1947) that there was good fishing in Mandakini and Alaknanda in spring (March and April) before the snow-water came down, implying that the fishes retreat to the lower stretches of the river (Alaknanda and Ganges) as the snow-water comes down. There is no report of abundant mahseer in Pindari river, (arising from Pindari glacier), a tributary of Alaknanda, Bhagirathi (arising from Gaumukh glacier) and Bhilangana (a tributary of Bhagirathi, arises from Khatling glacier) are not

mentioned in sport-fishing literature as a favourite abode of mahseer, which of course occur there (Sharma 1987). Similarly Gori Ganga, (which arises from Milam glacier), and drains into Kali (Sharada) at Jauljibi, is avoided by mahseer.

The best habitat for mahseer in Ganges presently lies between Karnaprayag and Rishikesh and in its major tributaries such as Mandakini and Nayar. Numerous smaller tributaries also drain into this river system. Total length of the habitat available to mahseer here is about 350 km. We do not know how the proposed Vishnu Prayag and Srinagar Hydel projects would affect mahseer in Ganga drainage. Since the water from Ganges is diverted to Chilla power channel at Rishikesh, the 16 km stretch of Ganges between Rishikesh and Haridwar, once a fine winter and feeding habitat, now has less amount of water. Mahseer, subjected to regular gill-netting, occur here in a low abundance. Even the population of mahseer which occurred in Haridwar (which served as an asylum in the past) has dwindled over the years. This is due to the sluice gate in the canal which takes water to Haridwar (Har-ki-pauri) and which the fish has to cross to enter the main river (Ganga). Uncontrolled fishing in the past, including dynamiting, polluted waters coming from Dehra Dun township, garbage and heavy siltation as a result of large-scale sand and boulder collection have led to the drastic decline of mahseer in Song river (has Suswa as a tributary) the only tributary where mahseer can go for spawning between Haridwar and Rishikesh. All these have gradually affected the abundance of mahseer between Rishikesh and Haridwar.

Yamuna river and it's tributaries such

as Amlawa, Agalar, Shadri Gad and Khutna Gad, may have about 100 km habitat, but its the potential as a mahseer habitat has suffered greatly as a result of developments related to hydel power production. In 1960-1965 a barrage at Dakpathar, about 6-km below Kalsi (Tons-Yamuna confluence), was built and from here bulk of the water from the river is taken in a 14.3 km power channel to Dhakrani and Dhalipur powerhouses. As a result the winter or feeding habitat available to mahseer in Yamuna, restricted between the barrage and Tons-Yamuna confluence, has less water. The construction of Ichari dam across Tons, 12-km upstream above Kalsi, and the Chibro and Khodri powerhouses which use Tons water have also affected the water availability above Dakpathar. The fish abundance below Dakpathar and Asan barrage, isolated from the main population above the Dakpathar barrage, should be extremely low. Lakhwar-Vyasi 420 MW project on Yamuna river, which was carried out for more than a decade since mid 1980s and where 60% of the work has been completed, is now lying idle for want of funds. This project has led to a lot of disturbance in Yamuna river and it may be renewed any time.

One major problem with such projects is the unlimited availability of dynamites (gelatin?) which are misused by people to kill fish. Yamuna and its tributaries are bereft of large mahseer in most parts of their stretch and one major reason for this dynamiting. In November 2005 one restaurant owner in Damta, a small town on the banks of Yamuna, reported that till 15 years ago the local fisherman used to supply him large fishes (5-10 kg) and now he gets only 100-200 gm fishes at the rate of Rs. 40/kg. There are more

dams in the offing in Yamuna drainage: Lakhwar dam (planned below Aglar-Yamuna confluence) and kishau dam in Tons (see www.uttaranchalirrigation.com for the location of these dams). The future of mahseer in Yamuna drainage is bleak.

Ramganga river with its tributaries such as Mandal and Palain, with about 60 km stretch of habitat, and the reservoir (when full covers 80 km²), all coming within the Corbett Tiger Reserve, has a great promise for mahseer conservation in Uttaranchal. Yet, even this habitat suffers as a result of dynamiting in both the tributaries and in the upper reaches of Ramganga. Further it is reported that some amount of fish sold in Ramnagar market by the 20 or so fishermen come from the Ramganga river and the reservoir. The fishermen get licenses from Ramnagar Divisional Forest Officer to fish in the Kosi river (where bulk of the fish stay around and are protected by the Infinity Resorts and the Garjia temple) and in Tumaria dam. Tet they bring mahseer to the market. The on-going conservation plan of Uttaranchal Government leasing out 2-km stretches of Ramganga river above Domunda to different anglers' association is a welcome step as the different associations can protect stretches of river leased out to them from dynamiting and gill netting. Yet the fact that a long stretch of river, above the first two kilometer stretch from Domunda leased out to Claridges Hotel, is not leased out to any agency can make the river extremely vulnerable to poaching. This situation needs to be rectified at the earliest.

The Khoh and Kolhu rivers belong to the Ramganga drainage. How does Kolhu river gets mahseer is still an enigma. It is possible that during heavy rains mahseer which

stay below Ramganga reservoir may come down (they can't go up and get into the reservoir because of very high sluice gates) to Khoh barrage near Sherkot and then ascend Kolhu river, a distance about 80 km.

Sharada (Jauljibi to Tanakpur), with its tributaries such as Saryu, East Ramganga (a tributary of Saryu), Lohawati and Ladhya, may have 200 km habitat inclusive of the nearly 30-km stretch of winter habitat between Chuka (Ladhya-Sharada confluence) and Tanakpur. The construction of a barrage at Banbasa in the 1960s and at Tanakpur (which is 10 km upstream of Banbasa) in the late 1990s has led to loss of a long stretch of wintering habitat for the fish population which is now confined only above the Tanakpur barrage. Although dynamiting is rampant in all the tributaries of Sharada, and netting by Nepalese in short stretches of the river below Kaladhunga is widely prevalent, the scope for mahseer conservation in Sharada is still immense. The proposed Pancheshwar Hydel Project, however, is a grave threat to this fabulous habitat.

The past and the suggestions for the future:

Golden mahseer was exceedingly abundant once in the present day waters of Uttaranchal. Stevens (1905) in one morning, before his rod broke, caught 15 mahseer totaling to 73 lbs in Song-Ganges confluence. Dhu (1923) reports of monsters between Rishikesh and Haridwar. Macdonald (1935) went along Sharada and its tributaries on two-month fishing holiday (total 100 hrs of fishing) and caught 117 fish (largest 96 pounds) which in total weighed 946 lbs. In April 1937 the Ladhya-Sharada confluence was so alive with fish, in one evening, enough fish were caught

to feed a camp of 30 people and in October 1938, one day, 125 fish were caught in Nandhour river (Corbett 1944, 1954).

This abundance gradually declined due to increase in human population with a concomitant increase in demand, change in fishing methods and habitat alteration. Traditional methods of fishing include use of line and hook (*kaanta*), castnets (*jaal*), snares (*fandi*), basket (*gowda*) trap and ichthyotoxic plants (e.g. 'Timura' *Xanthoxylum armatum*) (Bahuguna *et al* 2001). These methods practiced for decades did not take a heavy toll of fishes. But with the use of dynamites, bleaching powder and electricity, to kill fish on the spawning grounds, siltation caused by large scale sand, gravel and boulder collection and loss of winter of feeding habitats as in Yamuna, Ganga and Sharada the decline of fish population was rapid. The visitor book maintained in the Bautari forest bungalow (built in 1927), near the confluence of Saryu and East Ramganga river, where 100-300 human bodies are burnt every month (which provided enormous food to the fishes), clearly records the decline of mahseer and *goonch* as a result of regular, uncontrolled dynamiting. If destructive ways of fishing are not controlled the future of mahseer, even in Uttaranchal, where the potential is enormous, seems to be bleak. The situation looks more ominous in the context of the several hydel projects planned in the State. We come up with the following recommendations to ensure the future of golden mahseer in Uttaranchal and help conservation of other species in the country.

- The need of the hour is to start a campaign to put an end to dynamiting, use of bleaching powder and electricity to kill mahseer. Ending the use of dynamites (gelatin) could be

achieved in two fronts: by use of dynamites which do not explode in water and a conservation education programme for the villagers living adjacent to the mahseer habitat; forest, police and para-military personnel (e.g. Special Security Bureau force stationed along Sharada). If we do not have the former (dynamite which does not explode in water) responsible institutions should be requested to undertake research and promote the availability of such a tool for the various construction projects that are carried out in the country. Conservation education against use of dynamites, bleaching powder and electricity should be carried out with the help of Educational Institutions, NGOs, Anglers Associations, Rafting Camps, Newspapers, Radio and Television.

●Uttarakhand Government should change the present regulation of not allowing anglers to fish in major spawning season (July to September) as this is the season when the fish are extremely vulnerable to destructive ways of fishing when they ascend the spawning streams. Presence of anglers can definitely deter fish poachers as the senior author has seen it in the Mandal river along the northern boundary of Corbett Tiger reserve.

●Angling as a hobby should be promoted in Uttarakhand and other states and the Institutions where the liking for this hobby could be inculcated among the officers are Indian Military Academy, Indira Gandhi National Forest Academy, Wildlife Institute of India, State Forest Service College and Lal Bahadur Shastri National Academy of Administration. More legal use of the mahseer habitat and the revenue generated through sport fishing would be a lasting way of strengthening conservation.

●More research and monitoring of the rivers

and streams are needed as our knowledge about the fish fauna of the Uttarakhand rivers and streams are negligible. For example we do not have an answer to a simple question, whether mahseer still go into Song river for spawning. A good field identification guide with clear pictures of the fishes of the Uttarakhand with identification guidelines and brief notes on the habitat is urgently needed. Wildlife Institute of India and Zoological Survey of India can play an active role in promoting research and developing such a guide book.

●Mahseer conservation plan should be an integral part of the new hydel projects that are being planned in Uttarakhand.

●Government of India should bring all mahseer fishes under the purview of Wildlife Protection Act. Placing them in any of the schedules from I to IV will make mahseer out of bounds for the anglers also, which is undesirable considering the positive role they can play in its conservation. Hence a new schedule (VII) should be created to include all mahseer and other sport fish which need legal protection. While illegal killing of these would be banned, angling with catch and release could be permitted by the chief wildlife warden or the authorized officer. Suitable modification (by addition of a subsection) in section 12 of the Act needs to be done which would empower the CWLW or the authorized officer to issue permits to anglers for catch and release mode of angling for all the species listed in Schedule VII. This would also herald a new era in the history of the Wildlife Protection legislation in India of non-consumptive utilization of wildlife resources.

●Villagers in the mahseer habitat should be permitted to catch fish for their consumption by use of line and hook, nooses and cast nets.

●Two types of angling should be permitted: one for catch and release and the other for table. In the former triple hooks with one barb should be used and steal leads, as they can cut the throat of the fish, should be avoided. In the latter a maximum of two fish could be permitted and a much higher fee should be levied. In both the cases, however, any large golden mahseer caught (>10 kg) should be released as it could definitely be a female.

The newly built Tehri dam, under the control of Forest Department, should be used to propagate local trout and mahseer species and on no account exotic carps (*e.g. Cyprinus carpio*, which is more like a pest now in Deoria Tal) should be introduced.

●Uttaranchal, which is being promoted as a herbal-environment friendly state, must start with a proper sewage treatment plan for its capital Dehradun whose untreated effluents and sewage are presently released in the Suswa-Song rivers which ultimately take it to the holiest of the Indian rivers the Ganges. This

has already seriously affected mahseer abundance in the stretch between Haridwar and Rishikesh. Stringent laws are urgently needed to control these problems.

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STATUS OF TIGER AND LEOPARD IN RAJAJI-CORBETT CONSERVATION UNIT, NORTH-WEST INDIA.

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Abstract

Rajaji-Corbett Tiger Conservation Unit (RCTCU), in north-west India, is one of the eleven Level-I Tiger Conservation Units (TCU) identified in the Indian subcontinent for the long-term conservation of the tiger. This TCU of about 7-500 km² stretches from river Yamuna to Sharda and includes portions of the Other Himalaya and the Shivalik hills. The tract is drained by numerous rivers/streams, many of which remain dry during most parts of the year, and are locally called 'raus'. Little less than one third of this TCU comes under protected areas (Rajaji National Park - 800 km². and Corbett Tiger Reserve - 1400 km²) and the rest are under various reserve forest divisions, four of which have been converted into monoculture plantations.

Between November 1999 and March 2000, we evaluated the status of tiger and leopard by counting the number of different pug marks on 3-5 km transect walks along 52 raus, for a total distance of 479 km in these reserve forests and plantations. Raus in the crucial Rajaji-Corbett corridor were walked more often than other raus. People and cattle seen along the transects, were also counted, as an index of disturbance. In this TCU, the tiger occurs in three isolated populations, and the total number of adult tigers may be around 80.

The leopard population may be between 300 and 500, and possibly still occurs as a single continuous population.

Due to increasing biotic pressures, the tiger has become extinct in four divisions, and there is a growing threat of further degradation and fragmentation of its habitat. To implement a recovery programme, we suggest several management measures such as control of poaching, resettlement of gujjars and five villages, creation and strengthening of corridors, conversion of monocultures into polyculture plantations and establishment of several mini-core areas including Nandaaur Valley National Park. Massive and sustained conservation effort is urgently needed to make RCTCU a functional reality.

1 Introduction

The rate at which the tiger (*Panthera tigris*) is losing its range, has lost its three subspecies and is declining in number from Ca. 100,000

at the beginning of the century to ca. 6000 now, is a sure indication that this magnificent species is racing towards extinction. The conservation status of tiger is worrying even in India, which has about half the total

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population in the wild (Jackson 1997, Thapar 1999). There are two major reasons for this sorry state of affairs. One is the unprecedented increase in human population, which in India, for example, was three hundred and sixty one million in 1951 and now stands at one billion. This is one sixth of the world's human population. This colossal human mass and its growing requirements put enormous pressure on the wildlife habitats. The other reason is the special requirements of the tiger, which as a species needs vast undisturbed habitats with abundant large wild ungulate prey (Johnsingh and Negi 1998). These requirements do not go well with the human population increase, which in most forested areas disturbs tiger habitat and competes directly with the tiger for prey. Also, most tiger populations, particularly in northern India during the last two decades, have been subjected to heavy poaching for bones, an important component in traditional Chinese medicine (Wildlife Protection Society of India 1998). We do not have sufficient information to assess the impact of these threats on the tiger populations.

In this scenario, the need of the hour is to identify, protect and manage landscapes of tiger habitats as assiduously as possible so that as many tiger populations as possible can be protected across its range. Fortunately, two studies (Johnsingh et al. 1991, Dinerstein et al. 1997) have identified such landscapes for India and the Indian subcontinent respectively. What is now urgently needed is to identify the threats to these landscapes, quantify biotic pressures and assess the status of tiger and its associated species. Such studies will provide information to enable us to evolve suitable conservation programmes for each region to maintain and restore habitat integrity, reduce

biotic pressures and safeguard the future of the tiger.

This paper assesses the status of the endangered tiger and the still common leopard in Rajaji-Corbett Tiger Conservation Unit (RCTCU), identifies the threats, quantifies biotic pressures, and gives appropriate and broad management recommendations for the recovery of the tiger population.

2. Study area

RCTCU is one of the 11 Level-I Tiger Conservation Units (TCUs) identified in the Indian subcontinent for the long-term conservation of the tiger (Dinerstein et al. 1997). This TCU¹ includes portions of the outer Himalaya and the Shivalik hills in the state of Uttar Pradesh. After the formation of the new state

*After the formation of the new state Uttaranchal most parts of RCTCU, except the Shivalik and Bijnor divisions, come under the new state.

Uttaranchal most parts of Rajaji-Corbett Tiger Conservation Unit, except the Shivalik and Bijnor divisions, come under the new state. Uttaranchal extends from river Yamuna in the west to river Sharda in the east. This tract is drained by numerous rivers and streams running north to south, most of which remain dry in late winter and summer. These dry beds are locally called 'raus'. Even until 30 years ago, this sal (*Shorea robusta*) dominated forest tract, which is now about 300 km long and ca. 7500 km² in area, was continuous and much more extensive. Over the years the growing human population and its demand for more forest land for agriculture and other developmental projects have broken the continuity across River Ganges and along

Kathgodam-Haldwani-Lalkuan Highway, hereafter the Highway. The pressures on the remaining forest land by the pastoral gujjars, people in the adjacent towns and villages, and their livestock, grow day by day severely threatening the wildlife values of this area. Yet this TCU is the most vital conservation area in north-west India for large mammals (Johnsingh et al. 1991, Johnsingh and Panwar 1992, Government of India 1993, Dinerstein et al. 1997).

About one-third of this TCU comes under protected areas [the proposed Rajaji National Park (RNP, 820 km²) and Corbett Tiger Reserve (CTR, 1400 km²)] and the rest is reserve forests under various forest divisions (Fig.1). Starting from west to east the divisions are Shivalik, Dehra Dun, Narendranagar, Haridwar, Lansdowne, Bijnor, Tarai West, Rarnnagar, Tarai Central, Haldwani, South Pithoragarh and Tarai East. Five divisions (Haridwar, Bijnor, Tarai West, Tarai Central and Tarai East) are plantation divisions. In these divisions, large-scale mechanised plantations of softwood (e.g. *Eucalyptus* spp., *Ailanthus excelsa*, *Populus ciliata*) and hardwood (e.g. *Acacia catechu*, *Dalbergia sissoo*, *Tectona grandis*) were raised in the 1960s to meet the industrial needs, replacing the *tarai* miscellaneous forests and grasslands. These monoculture plantations, which still exist, have changed the habitat composition drastically as agricultural crops were also raised in the interspaces resulting in round-the-year disturbance to tiger and its prey species. Exotic weeds like *Lantana camara* and *Parthenium hysterophorus*, and native weeds like *Adhatoda vasica*, *Cannabis sativa* and *Cassia tora*, are a problem throughout this TCU.

3. Methods

The information on tiger and leopard, prey species, elephant (*Elephas maximus*) and disturbance factors - cattle, cattle camps, people - was collected with the assistance of staff, working with a non-governmental organisation (NGO), Operation Eye of the Tiger - India and the staff of the Uttar Pradesh Forest Department. Three to five km transects along selected raus, (n=52), where the chances of seeing tiger pug marks were more, were walked by the chosen staff. The staff was trained to locate and identify tiger and leopard pug marks, and count and differentiate the pellets of various ungulates: sambar (*Cervus unicolor*), chital (*Cervus axis*), nilgai (*Boselaphus tragocamelus*), barking deer (*Muntiacus muntjac*) and goral (*Nemorhaedus goral*). Wild pig (*Sus scrofa*) diggings and elephant dung were also counted. The staff of the NGO and the Forest Department worked in teams of two, searched for and counted these evidences in a width of 3-5 m while walking the transects. While returning they walked along the other side of the *rau* (if it is more than 10m wide) looking only for pug marks. When tiger and leopard pug marks were seen they were not traced to identify individuals (Choudhury 1970, Panwar 1979) as identification of individual tigers from tracks poses many problems (Karanth 1987). The length and breadth of the pug marks were measured and the measurements were later used to differentiate already recorded and new pug marks located on the transects. Cattle (*Bos indicus*) and buffalo (*Bubalus bubalis*), and people seen while walking the transects were counted, and the entire length of the *rau* within the forest was later walked to count the number of cattle camps. The transects were

walked early in the morning, before cattle effaced the signs, and in winter when the raubeds were wet, a condition ideal for locating pug marks.

Between November 1999 and March 2000, our staff walked a total of 479 km in the forest divisions listed above. They did not walk in the two protected areas (RNP and CTR), since the status of tiger and leopard here is known to us, from our long experience in these areas. They also walked 11 km along the right bank of the Ganges, counting elephant tracks. Tracks of chital, sambar/nilgai and leopard were also recorded along 7.7 km of this transect. Hundred and twenty kilometres along the southern boundary of CTR were also walked to assess the wildlife use of the area. The data that we had earlier collected, on ungulate abundance along "Burnt Hill" transect in Dholkhand, the most undisturbed area in RNP, by walking a total of 15 km in 1988 and 13 km in 1999, is also used in this paper.

4. Results

Table 1 summarises the results of the transects related to the number of kilometres walked, number of tiger and leopard pug marks seen and cattle and people encountered. The following results emerged as a result of these surveys. In RCTCU tiger occur in three isolated habitat blocks.

One is from Yamuna to the west bank of river Ganges, which includes the forest divisions of Shivalik, Narendranagar, Dehra Dun (total tiger habitat *ca.* 1000 km²) and the Rajaji-Motichur (*ca.* 500 km²) part of RNP. Our surveys along the west bank of the Ganges (Table 2), in the proposed Chilla-Motichur corridor area, showed that tigers do not use the west bank and therefore do not cross the

river. Along the entire length of Ganges in this tract, the corridor area is the only place where tigers could make an attempt to cross, as the rest of the bank is under human occupation. Tracks indicated that other species, such as leopard, chital, sambar, nilgai and elephant, still use the right bank. There could be 6-10 adult tigers in this habitat block, largely confined to the Rajaji-Motichur area (Johnsingh and Goyal unpublished data).

The second is from the east bank of the Ganges to the Highway. This tract is about 4000 km² and includes the Chilla part of RNP, CTR, Lansdowne, Haridwar, Bijnor, Ramnagar, Tarai West and Tarai Central forest divisions.

There could be *ca.* 50 adult tigers in this stretch of habitat. The tiger habitat from the eastern end of the Rajaji-Corbett corridor (Khoh river and Kotdwar town) to the Highway is at least 3000 km², is the largest and most compact tiger habitat in Uttar Pradesh.

The third is from the Highway to River Sharda. This area is about 1800 km² and includes the Haldwani, South Pithoragarh and East Tarai forest divisions. The area could have 10-15 tigers.

Two disturbing results emerged. One is the near absence of tigers in the *ca.* 1000 km² forest area in Dehra Dun, Shivalik and Narendranagar forest divisions west of Rajaji-Motichur. Here we walked 87 km. and the encounter rate for tiger pug marks was 0.01, leopard 0.28, cattle 4.69 and people 2.34. It should be noted here that there are not tigers west of the Yamuna, in the state of Haryana. The other is the danger of further fragmentation of tiger habitat along the Rajaji-Corbett corridor. The encounter rates of tiger pug

marks here was 0.02, leopard 0.56, cattle 7.35 and people 5.1 (Table 1). Tiger use of this area of enormous disturbances, which arise largely from Kotdwar town and the adjacent villages (Table 3), is negligible.

The status of tiger in the eastern part of TCU (between the Highway and Sharda), including the Tarai East, Haldwani and South Pithoragarh forest divisions, is not as bleak as it is in Dehra Dun, Shivalik and Narendranagar divisions. Here we walked 81 km and the encounter rate of tiger pug marks was 0.1, leopard 0.19, cattle 6.43 and people 2.14. Biotic disturbances here are as high as in the western portion of TCU. Yet more tigers still use this area.

Leopard pug marks were encountered in all the divisions including the ones where tiger pug marks were absent (Table 1). Ecologically and behaviourally, the leopard is much more adaptable than the tiger (Johnsingh 1983), and we believe that the leopard population in TCU could be between 300 and 500. This may still be a single population, with occasional movement across the Ganges in the Chilla-Motichur corridor area above Rishikesh, where there are many bridges across the Ganges, and around Kathgodam.

5. Discussion and Recommendations

We have demonstrated here that by using a simple "user-friendly" method it is possible to gather basic vital information crucial for planning conservation. Such simple repeatable methods for survey of vast areas are recommended by Karanth (1999) and Rabinowitz (1999). Miquelle et al. (1999) and Smith et al. (1999) have demonstrated the feasibility of such methods in the Russian Far

East and in Nepal respectively. Now the challenge before us is to ensure the long-term survival of tiger in this TCU, using the information gathered.

Information available (Singh 1969, Table 4) indicate a declining trend in tiger numbers in this TCU, and extinction seems imminent for many of the populations. For example, Shivalik and Bijnor divisions, which had more than 5 tigers about 12 years ago, have none now (Table 4). Extinction in the Shivalik division can be attributed to high biotic pressures, which include the presence of a large number of *gujjar* settlements and intense bhabar grass (*Eulopsis binata*) collection for rope making from the steep Shivalik hills between November and March. The poverty-stricken grass cutters not only disturb the area but also steal the large kills of leopard and tiger, aided by the cawing of jungle crows (*Corvus macrorhynchos*). Poaching and livestock grazing, major conservation problems throughout India, are also rampant here.

Another major reason for the disappearance of tigers in the Shivalik division is the absence of a source population nearby. Tigers are absent across Yamuna and there is lack of sufficient breeding to maintain the population in the Rajaji-Motichur area. In Dholkhand area in Rajaji, we have even recorded a decline in sambar abundance. The encounter rate of sambar in 1988 along the Burnt Ridge transect was 5.33, and in 1999 it was only 2.23 ($p < 0.006$, Table 5), which possibly indicates a decline in habitat quality for sambar. Sambar is a preferred prey of tiger in the Indian subcontinent (Schaller 1967, Tamang 1982, Johnsingh 1992). Populations at the extreme end or the periphery of the range of the species are usually sparse (Hengeveld

and Haeck 1982) and have a greater chance of going extinct (Beddington et al. 1976, Lawton 1995). Extirpation of tigers in the Shivalik division stands as an example for this valid biological statement.

Extinction in the Bijnor division can be traced to one or a combination of several factors: (i) conversion of natural vegetation, which offers cover to tiger, and cover and forage to prey species such as sambar and wild pig, to Eucalyptus plantations, (ii) human disturbances including gujjar settlements, (iii) poaching and (iv) cattle grazing. Interestingly tigers still occur in Tarai West and Tarai Central divisions, which are also plantation divisions and subjected to enormous biotic pressures. Tiger pug mark encounter (Table 1) was greater in Tarai West as it is next to CTR, where breeding is still vigorous, with occasional sightings of a mother with four grown-up cubs. It is likely that the tiger may become extinct in Tarai Central in the near future as it is farther from CTR, particularly if the Nihal-Bhakra corridor between Ramnagar and Tarai Central divisions is not protected and specially managed.

Based on the enormous day and night traffic, and human settlements along the Highway, we concluded that for large mammals the forests east of the Highway are now isolated from the forests west of the Highway. The occasional immigration of tigers from Nepal where the Suklaphanta population range extends to the river Sharda (Smith *et al.* 1999) may be the major factor that tigers still occur in this highly disturbed tract.

Heavy traffic and conversion of forests into human settlements has already fragmented the tiger habitat along the west bank of Ganges and the Highway.

Although there are no major developments along the Rajaji-Corbett corridor, sighting of only three pug marks after walking 155 km creates a very strong evidence that tiger habitat fragmentation is almost complete here. When total fragmentation occurs, we will end up with another isolated population of 4-6 tigers in the Chilla part of RNP (east of river Ganges) and adjoining forests, a total of about 600 km².

History of tiger extinction and conservation in this tract clearly demonstrates that the most crucial factor that has helped the survival of tiger west of Ganges is the protected area status given to Rajaji and Motichur areas way back in 1966-67. Before the formation of these sanctuaries, the forests west of Ganges came under Shivalik, East Dehra Dun and West Dehra Dun divisions. In 1966, 90 km² of Dehra Dun division was upgraded as Motichur Wildlife Sanctuary and an area of 249 km² of the Shivalik division was notified as Rajaji Wildlife Sanctuary (Johnsingh 1991). Before the formation of these sanctuaries, all these divisions had tiger, although at a density of one per 40 km², which is low when compared to the density of one per 22.5 km² in the Himalayan foothills and one per 16.5 km² in the Tarai region (Singh 1969). But conservation of a protected area is more expensive than managing a Reserve forest. The average conservation cost for Rajaji National Park for the period 1997-2000 was Rs. 125,000 (US \$ 2840)/km². The cost for Shivalik division was Rs. 43,015 (US \$ 979)/km² and Dehra Dun Division Rs. 60,570 (US \$ 1377). The 800 km² National Park although fragmented by developments on either side of Ganges (Johnsingh *et al.* 1990) still has 15-20 tigers.

In a populous country like India, where about 36% of the people live below the poverty line (Manorama Year Book 2000), conservation, particularly tiger conservation, which needs vast undisturbed well-managed habitats, is even more difficult. It should be remembered that although this TCU is about 7500 km², the habitat used by tiger is only about 4000 km², due to disturbances in the rest of the area. To enable tigers to thrive in RCTCU, which would include staging a comeback in areas where it has been extirpated in the recent years, we have come up with the following recommendations:

5.1 control of poaching

This tract, like any other wildlife habitat in Asia, has been under low-intensity but continuous covert poaching for many decades, and this is the reason for the absence or low density of large mammals in most parts of this area. Poachers include occasional jeep-bound search-light wielding gangs from the towns, tour operators in places like CTR, villagers who poach for the pot, and professional poachers who kill to sell the meat to make a living. Poison, snares, jaw-traps, bombs and guns are used in poaching. Legal hunting is banned in India yet there are close to twenty shops that sell guns and cartridges in the towns around this TCU. The local people have 40,000-50,000 licensed guns and buy a minimum of 100,000 cartridges annually. There are also reports of the use of Forest Department guns in poaching.

To enable the recovery of wild ungulate populations we suggest that all the guns in and around this TCU for a distance of 10 km should be withdrawn at least for the next five years. Attractive financial incentives

to the tune of US\$ 1000 should be offered to anyone apprehending a wild ungulate poacher who may still be poaching with illegal guns, and special training in anti-poaching measures, including information gathering, should be given to the staff.

NGOs like Operation Eye of the Tiger - India and Corbett Foundation could assist the Forest Department in this task. These measures would not only help the recovery of ungulate populations but also control leopard and tiger poaching as the Forensic Laboratory of Wildlife Institute of India has received 142 leopard and 10 tiger skins from Uttar Pradesh for verifications during the period, January 1988 to July 2000 (S.P. Goyal, unpublished data). With the existing staff, and a little more motivation and training, control of poaching could be accomplished very significantly. In close collaboration with the wildlife staff of Nepal, poaching arising across the Sharda should also be controlled.

5.2 Gujjar relocation

Gujjar relocation from Rajaji National Park, initiated in the year 1983, should be completed as early as possible. Other divisions from where *gujjars* should be relocated are Lansdowne, and Kalagarh, which is now part of CTR. Gujjar resettlement would considerably reduce the biotic disturbances, and facilitate the recovery of wild ungulate and predator populations in the Chilla-Motichur and Rajaji-Corbett corridors.

5.3 Village relocation

At least five villages should be resettled from this TCU. One is Ganga Bhagpur Thalla village between River Ganges and the power channel on the left bank of

Ganges. This village of about 30 families (ca. 300 people) is close to the only patch of riverine forest (ca. 2.5 km long) along the entire length (2,500 km) of River Ganges, still being used by tiger and elephant. If this village is not translocated, the riverine forest would eventually disappear, as a result of the firewood and timber needs of the village people_ (Johnsingh et al. 1990). Shifting of three villages (Ringora, Amdanda and Tedha, each with ca. 20 families and 200 people) would avoid the future threat to the connectivity between CTR and Ramnagar forest divisions. _Moving of Laldhang village, ca. by the Government of Uttar Pradesh, would significantly strengthen conservation in the southern boundary of CTR (Johnsingh and Williams 1999).

5.4 Conversion of monoculture into polyculture plantations

Conversion of monoculture plantations along the southern boundary of CTR and in Tarai West, Tarai Central and Tarai East divisions into patches of polyculture plantations would help recovery of sambar and wild pig populations. This can be achieved by planting species such as *Holoptelia integrifolia*, *Derris indica*, *Dalbergia sissoo* and *Syzygium cumini*, which are not eaten by domestic and wild ungulates. Cover and more wild ungulate prey would even enable tigers to breed in these plantation areas.

5.5 Creation of mini-core areas

The best patches of wildlife habitat in this TCU, e.g. Rawason catchment area in the RAjaji-Corbett corridor, should be identified as mini-core areas, whose size will vary from 20 to 50 km². At least 12 mini-core areas,

three in the Shivalik division, one each in the Rajaji-Corbett corridor, and in the forest divisions of Dehra Dun, Haridwar, Bijnor, Ramnagar, Tarai West, Tarai Central, South Pithoragarh and Tarai East, should be established. These mini-core areas should be freed of all forms of disturbances -*gujjar* settlements, grazing and *bhabar* grass collection - so that their status will be as good as National Parks and would improve the capability of tigers to live and breed in these habitats, which are otherwise disturbed and seldom visited by tigers.

5.6 Reduction of biotic disturbances to Rajaji-Corbett corridor

The biotic disturbances arising from Kotdwar town and villages adjacent to the Rajaji-Corbet corridor should be reduced as much as possible. This would be possible if a massive ecodevelopment initiative involving promotion of biogas, better breed of cattle and use of cooking gas is made, to wean the villagers from the collection of fuel wood, fodder and *bhabar* grass from the corridor area. A massive conservation education programme should be launched with the assistance of local NGOs to seek the support of the youth of Kotdwar in reducing disturbances to the corridor area.

5.7 Creation of Nandaaur Valley National Park

Nandaaur Valley National Park (ca. 100 km²) should be established in the Haldwani division covering the catchment area of the picturesque Nandaaur River, where there are no villages and only temporary cattle campe that are in the danger of becoming permanent. This National Park could become a breeding

dwindle and degrade day by day and disappear eventually.

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site for the tigers and significantly improve the status of tigers in the eastern portion of the TCU.

5.8 Establishment of corridors

Two corridors, Chilla-motichur across Ganges and Lalkuan, between Central and East Tarai forest division, are vital to enable this TCU to function as one ecological unit. Chilla-Motichur corridor should be established without any further delay. Sufficient funds for this are available with the Government of India. It is desirable that an organisation like WWF-India deputes as officer to help the Government of Uttaranchal to facilitate the establishment of this corridor.

Creation of the corridor between Central and East Tarai divisions will be difficult but may be possible south of Lalkuan where a large Government timber depot exists in Central Tarai division, adjacent to the Highway.-The depot should be shifted, a 1km² area east of the depot, between the road and the Goula *rau*, should be acquired, and at least a 2 km stretch of Goula *rau* parallel to the corridor should be declared a "disturbance free zone" banning boulder collection. About 10 km² of forests adjacent of the corridor area, both in the Central and East Tarai divisions, should be managed as special wildlife habitats to encourage large mammal use of the area. Even if this is achieved, disturbances along these two corridors, particularly traffic in day time will be enormous. But the fact that tiger occasionally moves long distances across zones of disturbed habitats (Sunquist and Sunquist 1983, and sighting of a tiger in Bharatpur National Park, Rajasthan, in end July 2000 which should have travelled at least 50 km from the nearest tiger habitat across

human dominated landscape) gives the hope that there will be occasional movement of tigers across these corridors at night.

5.9 Conservation of Greater CTR

The future of the ca. 3000 km² habitat block from Khoh river (Kotdwar) to the Highway should be made as inviolate as possible. The suggested total control over poaching, *gujjar* relocation from Lansdowne and Kalagarh divisions, the relocation of villages, creation of mini-core areas, special management of Nihal-Bhakra corridor and conversion of monoculture into patches of polyculture would go a long way in strengthening this vital tiger habitat in north-west India. Any major development in the vicinity of this habitat block, particularly building of an all-weather road either along the southern or northern boundary of CTR, should be avoided. Our studies along the southern boundary of CTR show that even now biotic disturbances are high (Table 6).

We are aware that, in this human, cattle and weed dominated landscape, it will be extremely difficult to fully implement a recovery programme like the one we have recommended. Yet we wish to try and make a change which would be better for the tiger. We believe, like Burge (1999), that by saving the tiger we save complex ecosystems and habitats that would otherwise be destroyed in the relentless march of human need and all too often, greed. We agree with Seidensticker et al. (1999) that landscapes with tigers are worth more than landscapes without them. We conclude with a fervent hope and plea that a massive and sustained conservation effort will be launched as early as possible to save the tiger in this habitat which would otherwise

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Table 1: Encounter rates (in parentheses) of tiger and leopard pug marks, and cattle and people seen in different forest divisions, November 1999 to March 2000.

Forest division, Area in km ²	Km walked	No. of tiger pug marks	No. of leopard pug marks	Cattle seen	People seen
Shivalik, 332	33	0	14 (0.42)	293 (8.88)	147 (4.45)
Dehra Dun, 510	39	1 (0.02)	4 (0.10)	62 (1.59)	36 (0.92)
Narendranagar (part), 150	15	0	6 (0.40)	53 (3.53)	21 (1.40)
Haridwar, 370	20	0	8 (0.40)	163 (8.15)	50 (2.50)
Bijnor, 344	15	0	3 (0.20)	94 (6.27)	113 (7.53)
Lansdowne (corridor area), 250	155	3 (0.02)	87 (0.56)	1140 (7.35)	791 (5.10)
Ramnagar, 487	48	12 (0.25)	10 (0.21)	73 (1.52)	101 (2.10)
Tarai West, 350	15	5 (0.33)	4 (0.27)	838 (55.87)	97 (6.47)
Tarai Central, 404	15	2 (0.13)	4 (0.27)	218 (14.53)	51 (3.40)
Tarai East, 801	15	1 (0.07)	4 (0.27)	192 (12.80)	40 (2.67)
Haldwani, 768	50	6 (0.12)	8 (0.16)	209 (4.18)	118 (2.36)
South Pithoragarh, 400	16	1 (0.06)	3 (0.19)	120 (7.50)	15 (0.94)

Table 2: Signs of large mammals seen along the west bank of River Ganges (transect length = 1.1 km).

Species	No. of times walked	Mean encounter rate (No./km)	95% confidence limits	
			Lower	Upper
Elephant	10	0.27	0	0.58
Chital	7	8.70	6.09	11.31
Sambar/Nilgai	7	12.34	6.40	18.28
Leopard	7	0.26	0	0.53

Table 3: Biotic disturbances that arise from Kotdwar and adjoining villages in the Rajaji-Corbett corridor area, November 1999 to March 2000. Encounter rates are in parentheses.

Range	No. of <i>raus</i> walked	Distance walked (km)	Tiger pug marks seen	Leopard pug marks seen	No. of cattle seen	No. of people seen
Laldhang	6	110	2 (0.02)	80 (0.73)	652 (5.93)	429 (3.90)
Kotdwar	3	45	1 (0.02)	6 (0.13)	488 (10.84)	362 (8.04)

Table 4: Tiger and leopard number in Rajaji-Corbett Tiger Conservation Unit according to Forest Department Census.

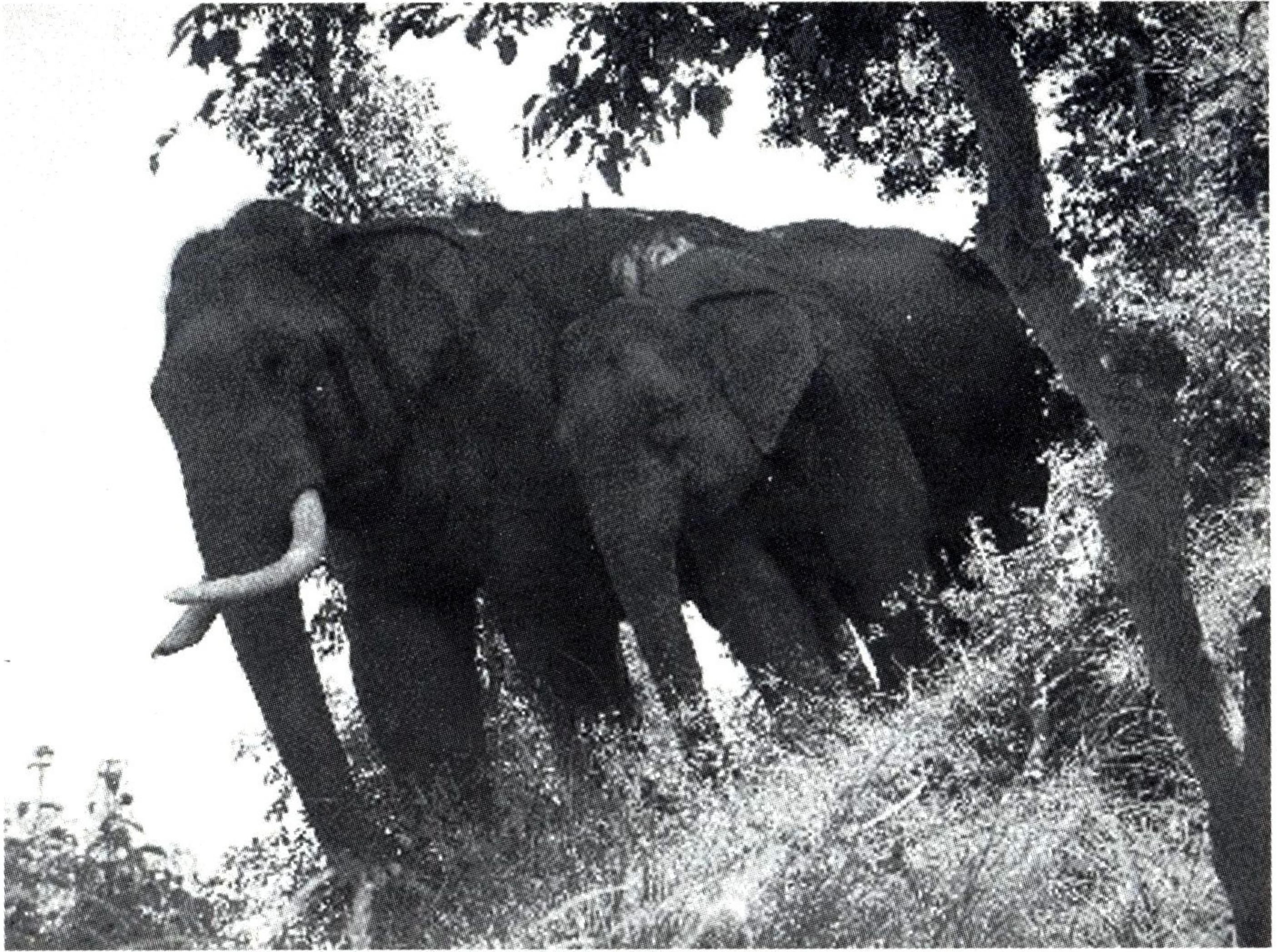
Division / Protected Area	Year			
	1984	1989	1993	1995
Shivalik	1	6	0	0
Dehra Dun	10	2	0	0
Rajaji	13	33	18	22
Bijnor	7	10	0	0
Lansdowne	25	30	15	7
Kalagarh (including Sonanadi Wildlife Sanctuary)	44	48	35	24
Corbett National Park	90	91	88	90
Ramnagar	40	42	17	25
Nainital	13	10	3	4
Tarai West	30	31	19	7
Tarai Central	13	17	19	11
Haldwani	42	43	20	15
Pithoragarh	20	0	0	0
Tarai East	12	17	9	8

Table 5: Decline in sambar and barking deer abundance along Burnt Ridge, (1.65 km) Dholkhand, Rajaji National Park.

Species	Burnt Ridge (Late Feb. to June 1988) Km walked 15	Burnt Ridge (Late Feb. to June 1999) Km walked 13
Sambar	80 (5.33)	29 (2.23)
Chital	24 (1.60)	113 (8.69)
Goral	8 (0.53)	53 (4.08)
Barking deer	10 (0.67)	1 (0.08)
Total animals seen	122	196

**Table 6: Tracks and large mammals seen along Laldhang-Pakhrau Forest Road, CTR southern boundary, May-June 1999.
Leopard and sambar signs were not seen.**

Total distance walked (km)	Signs seen			Animals/people seen							
	Tiger pug marks	Elephant tracks	Elephant dung	Elephant	Nilgai	Chital	B.deer	Wild pig	Cattle	Dogs	People
120	4	5	41	2	4	66	7	12	145	16	84



Elephant sightings, particularly in summer, are very common in Chilla range after Gujar relocation
Photo: Bivash Pandav



Uttaranchal has immense potential for sport fishing provided the fishes are protected on their spawning ground Photo : Misty Mahseer



Uttaranchal can boast of a single population of ca.200 tigers if the habitat from Yomuna to Sharda river is managed as one conservation unit. Photo: S.P. Goyal



Goral can be abundant in Uttaranchal provided poaching is under control
Photo: A.J.T. Johnsingh.



Gorgeous Sharda river. It can be a fortress of mighty golden mahseer
Photo: A.J.T. Johnsingh.



This article is dedicated to Shri A.S. Negi,
retired Chief Wildlife Warden, Uttarakhand,
Photo : A.J.T. Johnsingh.

Rhododendron arboreum,
an ecotourism species
Photo: A.J.T. Johnsingh.



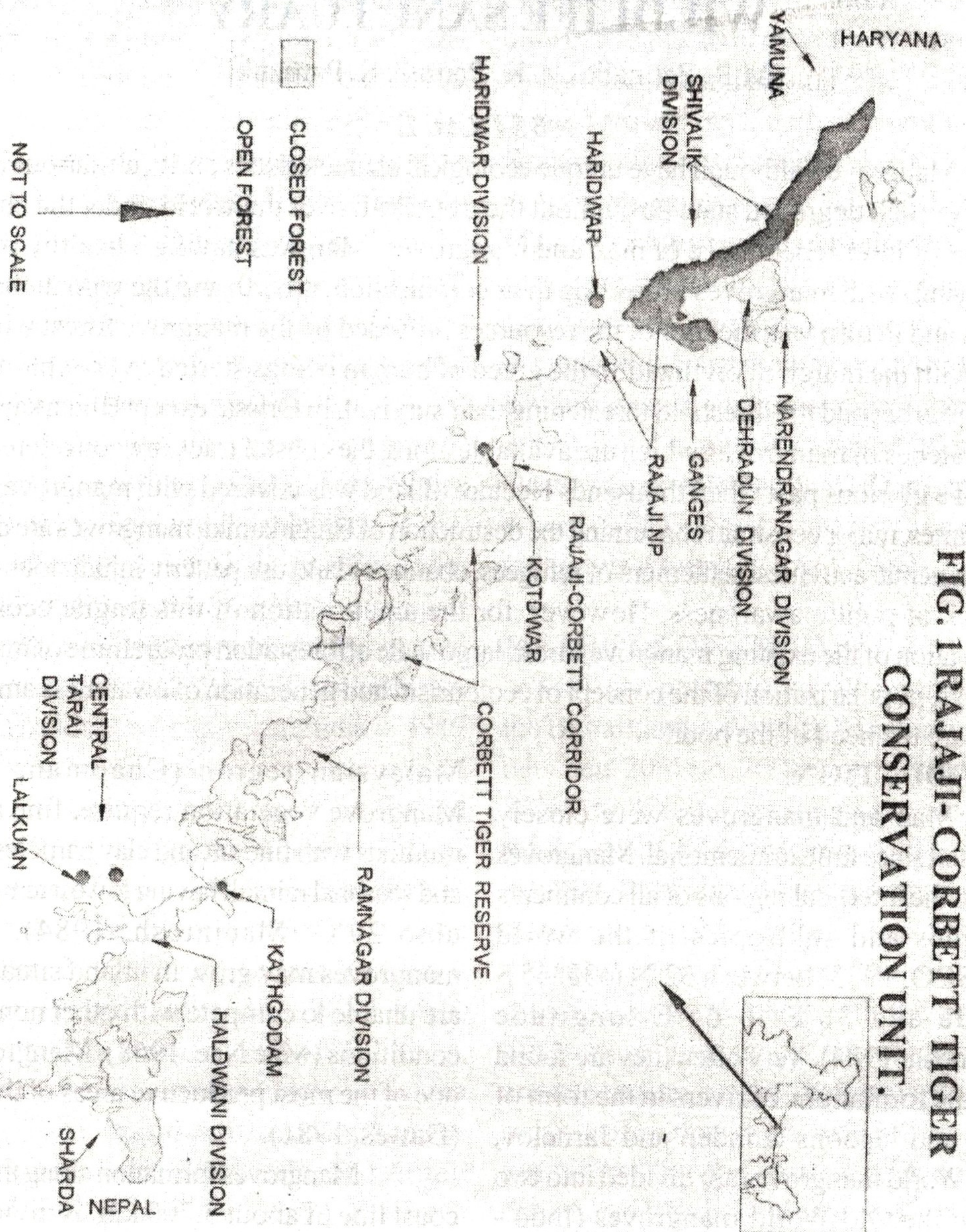


FIG. 1 RAJAJI-CORBETT TIGER CONSERVATION UNIT.

MAN AND MANGROVES: A REGIONAL FRAME WORK OF INTERACTIONS IN BHITARKANIKA WILDLIFE SANCTUARY

M.R. Pattnaik *, A.K. Patra **, S. Pattnaik ***

ABSTRACT.

Mangroves, although have unique ecological characteristics and multifarious uses are in a very much degraded state throughout the tropics all over the world under the changing scenario of interdependence of man and mangroves. Man was having a healthy two way relationship with mangroves protecting their colonisation, growth and the wild fauna living there in and in turn was the user of the resources provided by the mangrove forest within it's limit. With the march of civilization the greed of human beings started over exploiting the mangroves beyond the threshold threatening their survival. In Orissa, except Bhitarkanika, the small patches of mangroves which are available along the coastal track are considered as the relics of a glorious past when thousands Hectare of land was covered with mangroves. In the recent times, major constrain concerning the destruction of Bhitarkanika mangroves are different developmental activities, settlement of refugees, change of land use pattern, injudicious tourism and lack of public awareness. However, for the amelioration of this fragile ecosystem, conservation of the existing mangrove forest, large scale afforestation programme of mangrove seedlings, popularization of the concept of ecotourism and generation of awareness among the public are the need of the hour.

INTRODUCTION:

Man and mangroves were closely associated since time immemorial. Mangroves exists in the intertidal regions of all continents of tropics and subtropics of the world (UNESCO, 1973) between 32°N to 38° 45 S latitude and 30°E to 65°E longitude (Macintosh, 1984). Very often they are found as deltaic formations of rivers in the form of creeks and lagoons (Linden and Jarnelov, 1980). World mangroves are divided into two groups: the Old World mangroves (Indo - West Pacific) and the New World mangroves.

The greatest concentration of mangrove species is met with in the Indo -

Malaysian region (Chapman, 1975). Mangrove vegetation require, fine alluvial mudflats with fine silt and clay particles, higher and seasonal rainfall having lowest temperature upto 20°C (Macintosh, 1984). Rarely mangroves may grow in inland situation but are unable to compete with other non-littoral conditions (Mac Nae, 1968). Mangroves are one of the most productive areas of the planet (Dawes, 1981).

Mangroves formation along the Indian coast line of about 5,700 km. is divided into the mangrove of the East coast, West coast and island chains (Untawale, 1987). The east block is represented by the Sundarbans of

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West Bengal, coastal areas of Orissa, Andhra Pradesh, Tamilnadu, Andaman and Nicobar islands whereas the coastal tracts of Gujarat (Kutch region) and Maharashtra are the principal component of the West block (Thomas and Radhakrishnan, 1999). The extent of east coast mangroves is larger than that of west coast as the terrain in the former has a gradual slope in comparison with the steep gradient of the later (Untawale, 1987). India has deltaic, estuarine, back water and sheltered and insular bay types of mangrove formations (Krishnanmurthy, 1985).

In India mangroves cover an area of 6,81,976 ha. (Sidhu, 1963). This figure includes water areas and denuded flats (FAO, 1982) whereas several areas like Goa, Karnatak, Kankan, and Kerla are excluded (Untawale, 1987). The area actually covered by mangroves is only 356500 ha. (Blasco, 1977). The mangrove cover in India is 4917 km². of which 80% is along the eastern coast with major concentration in West Bengal (4263km²), Andaman and Nicobar islands (966 km²) and Orissa (211 km²) (Chadha and Kar, 1999). The other state which have mangroves in decreasing order are Gujarat (991 km².) Andhra Pradesh (383 km²), Maharashtra (124 km²), Tamil Nadu (21 km²), Goa (5Km².) and Karnatak (3 km²) (Chadha and Kar, 1999) Besides there are mangrove formations along the Kerla coast and Lakshadweep (Untawale, 1987). But once pristine mangroves of these areas are highly degraded due to heavy human pressure (Untawale 1984, 1987; GOI, 1989).

MANGROVES OF ORISSA STATE:

The 480 km. interrupted coastline of Orissa harbour mangrove vegetation from

Chandipur coast in Balasore district to Gopalpur in Ganjam district (Panda, 1988). Potential mangrove formations are confined only in two places namely the ex - zamindary areas of Kanika and Kajang. The former being located around the mouth of river Dhamra in Bhitarkanika area whereas the later is at the deltaic region of the river Mahanadi. Mangrove forest areas of Mahanadi delta in general and Paradip, Hookitola, Kujang and Jamboo areas in particular are very much degraded while these are very conspicuous in Bhitarkanika area (Patnaik and Choudhury, 1989). Total mangrove vegetation cover of Orissa is estimated to be 218.059 sq. km of which 171.561 sq. km is under dense mangrove cover (ORSAC, 1989).

METHODS OF STUDY:

The present study was conducted in the Bhitarkanika Wildlife Sanctuary located between 20°4' to 20°8' North latitude and 86°45' to 87°50' East longitude covering a total area of 672 km² from 1991 to 2000. Regular field trips were arranged to visit different parts of forested areas and to the villages in and around the sanctuary. Interactions were made with the people of different age groups and economic classes who are depending on the mangrove forests to satisfy their various needs based on proposition sampling. The perceptions of people were documented, coded and analysed accordingly.

OBSERVATIONS:

The area included in the sanctuary was a part of ex-Kanika zamindary. During zamindary administration there were six reserve forest blocks and 23 protected forest blocks. Resource extraction was only

permitted from the protected forest blocks and permits to that effect was issued to the local inhabitants at a cost of One rupee and One anna for collection of definite amount of small timbers, planks, barks, fuel wood, fodder, *Phoenix paludosa* leaves, materials for agricultural implements and construction purposes which were controlled by the Raja of Kanika. Zamindari was vested in the Revenue Department, Government of Orissa in 1951 and subsequently transferred to the Forest Department in 1957. Just before the abolition of Zamindari system, the Raja of Kanika leased out 10,765 ha. of forest land to the local inhabitants and the settlers from Midnapore. The area suffered from two major waves of immigration; one following the partition of India in 1947 and another after the Bangladesh liberation war in 1971. A large tract of the sanctuary was converted to agricultural fields under **Grow more food** and **Land to the Landless** programmes. In 1968 and 1971 to rehabilitate the inhabitants of Satavaya and Kanhupur villages 748 ha. and 769 ha. of forest lands were transferred to the Revenue Department in two phases.

After the Bangladesh liberation war in 1971, there was a massive influx of migrants from Bengal to this area, that changed the primary occupation of the people from cultivation to fishing. Agricultural lands were converted in to prawn culture farms. Large chunk of mangrove forests were encroached, clear felled and villages were created. Regular tidal inundation was blocked by plugging the creeks with earthen bunds. Outsiders and influential people started buying lands from private parties and converted those into prawn culture farms which were observed in Satavaya coast and near Gupti. Even a portion of turtle

nesting beach was sold to the private parties. From available record 2957 ha. of mangrove area were under encroachment for prawn culture. The flourishing villages like Bankual, Rangani, Talachua, Rajendranagar, Sailendranger, Rajeswarinagar were found with rapid growth of population expanding the village territory grabbing more and more mangrove forest lands, as the influx of immigrants is still going on. All-most all Bengali household were in possession on an average of 2 ha. of agricultural lands whereas some of them were the land owners of 20 to 25 ha. They were residing in independent houses with a courtyard having a small pond and either earthen bund of fence of *Phoenix* stem all around. A strong tendency among these people to expand their agricultural lands by illegally acquiring more and more forest lands was noticed. Although 3,60,000 inhabitants of 307 villages in and around Bhitarkanika Wildlife Sanctuary were dependent on 115 km². of mangrove forest area for their daily requirement of forest biomass, 32,806 number of people of 83 villages belonging to Dangmal, Iswarpur, Rangani and Talachua Grampanchayat were engaged in collection of firewood from the forest on daily basis, although a part of their fuel requirement was supplemented by the agricultural wastes, dry cowdung cake, coconut leaves and wood of *Acacia nilotica*. Important fodder species of mangroves were *Porteresia coarctata*, *Phragmites karka*, *Mytiostachya wightiana*, *Phoenix Paludosa* and the *Avicennia* species. This forest provided the fodder requirement of nearly 76000 number of cattle found in side the sanctuary from which about 6000 number water buffaloes of 41 villages depend mainly on the species of *Avicennia*. All most all house

holds resided in 'Kucha' houses, constructed by using small timbers of *Lumnitzera recemosa*, *Xylocarpus sp.*, *Avicennia sp.* and *Heritira fomes*. Stems of *Phoenix paludosa* were used for walling and rafters and also its leaves were exclusively used for thatching. Due to the frequent interference of the inhabitants with the wildlife and their habitat man and animal conflict was observed to be a common phenomena. Besides the construction of saline embankment by the Irrigation Department to facilitate irrigation for agriculture, had stopped the regular inundation which resulted the death of once rice mangrove vegetation. Construction of a fishing complex at Talachua with jetty, ice factory, fish drying yard, packing and auction hall, store house, provision of fresh water and repairing of nets adversely affected the mangroves of the area, more particularly mangroves of the Kalibhanjadia forest block. Construction of metallic road from Rajnagar to Talachua via. Dangmal with two bridges at Hansina and Khola opened the accessibility of vulnerable mangrove forest resources to the outside world. Increasing and unregulated ecotourism activities also often posed threat to the mangrove ecosystem due to oil spillage from mechanised boats, turbulence and loud noise. Lack of awareness among the public regarding the usefulness of mangroves was perceived to be the key factor for destruction of mangroves in Bhitarkanika region.

DISCUSSION:

Man has close association with mangroves since time immemorial. In the process of marching of civilisation, rapid industrialisation has changed this relationship into unilateral one. People from developing countries are utilising mangroves in a non-

sustainable manner (Thomas and Radhakrishnan, 1999). Over the years, mangroves have been utilised to obtain various kinds of raw materials useful to man in his daily life. The most damaging human activities which contributes to the destruction of mangroves are: deforestation, waste disposal, mining activities, coastal development, salt pans, fish ponds and similar other activities (Rao, 1991). Most of the mangroves all over the globe have been cleared for such purposes and India is not exception to this common run. Mangroves along the Indian coast are one of the most neglected living resources, that have been over-exploited for various purposes leading to the disappearance of many species (Deshmukh, 1991). Increasing population pressure, rapid industrialisation as well as rural and urban development are responsible for the reclamation of 2,00,000 ha of total mangrove area of Indian coast (Untawale, 1987).

According to the statewide report, potential areas of mangroves of Andhra Pradesh (Coringa, Godavari, Krishna), Kerla (Vembanad), Maharashtra (Ratnagiri coast), Andaman and Nicobar Islands (Andaman) and Goa are highly degraded because of heavy biotic pressure, conversion for agriculture and aquaculture practices and such other development activities (GOI, 1989). In Orissa also the important problems concerning the depletion of mangroves of Bhitarkanika are change of land use pattern, blocking of channels, removal of biomass, heavy biotic pressure and encroachment. Present observation for Bhitarkanika is in agreement with the reports of Untawale (1987), GOI (1989) and Rao (1991) in respect of India and international scenario.

Jagtap and Untawale (1980) have

reported that petrol, diesel and motor oil are highly detrimental to the survival of mangrove seedlings especially of the species of *Avicennia officinalis*. As oil spillage from mechanised boats and trallowers are contaminating the water and reaching the seedlings, the authors are of the opinion that its effect needs to be studied on priority in the areas like Kalibhanjadia forest block, Dangmal forest block and Bhitarkanika forest block.

Awareness among the local inhabitants and the people living in the near by areas seems to be of immense importance for the conservation of Bhitarkanika mangroves. This can be achieved through eco-development programmes, media, film show basing on utility of mangroves in Oriya language, and different awareness programmes by NGOs like road drama, song and such other actions. For the purpose of conservation of mangroves through eco-tourism, a novel concept called "Mangrove resort" has been put forward by George and Fernandez (1994) which shows that if properly managed, this system can encourage tourism and simultaneously impart awareness among the public about the specialty of mangrove ecosystem. Hence, it is proposed that such a system should be established in Bhitarkanika involving mangroves and tourism.

In Orissa there is a shrinkage of 2 km² of mangrove per year on an average (ORSAC, 1989). This is attributed to the fact that mangrove resources can continue to perpetuate and last for considerable time to serve human needs (Rao, 1991). But unlike most of the other genetic resources of forestry mangroves are dwindling beyond the critical point of no return. For conservation of mangrove resources, exploitation is to be kept

within sustainable limits which should be properly defined and research activities on various aspects of mangrove ecosystem should be urgently taken up incorporating the ecological modeling relating the aspects of floral, faunal and tourism together. Although some efforts have been made to afforest some area, large scale afforestation programmes will prove useful through people's participation and co-ordination of NGOs. For better implementation of conservation programme, involvement of Government agencies, local working groups, outside NGOs, villagers and researchers are highly essential.

CONCLUSION:

Mangroves have helped for wellbeing of man in many ways. They stabilise the shoreline and act as bulwark against the encroachment of the sea. They prevent soil erosion and the fury of cyclones and floods acting as shelterbelt. Mangrove flora and fauna provide the source of livelihood and avenues to gainful employment of the people inhabiting the coastal region. But man is ungrateful enough to exploit the mangroves in a non-sustainable manner and this unilateral relationship is detrimental to both man and mangroves. Though Orissa had luxuriant mangrove forests, most of them have been lost due to injudicious development and lack of awareness. The existing areas are also burdened with various problems threatening the survival of mangrove biota. Thus there is an urgent need for its conservation establishing proper harmony between developmental activities and protection of mangrove environment.

Mangroves of Bhitarkanika in the present scenario is at cross roads, where one way leads to its doom and the other to survival.

It not only depends on man which way the mangroves will go but on its survival depends the very survival of coastal human community.

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AVI-FAUNA OF SARANDA

Introduction

India comes in the top ten of the world's biodiversity rich nations. Its immense biological diversity represents about 7 percent of the world's flora and 6.5 percent of the world's fauna. It embraces ten biogeographic zone and 26 biotic provinces (Rodgers and Panwar, 1988). There are more than 600 species of amphibians and reptiles, nearly 1300 species of birds and 350 species of mammals in India. Among the larger animals, 173 species of mammals and 78 species of birds (Islam and Rahmani, 2002) are considered threatened with extinction.

Among all the groups of animals in the world, birds are most liked owing to their rich coloration, song, easy recognition and liveliness. Moreover birds are present everywhere from Forests, grasslands and wetlands to crop fields and city gardens. Fortunately our country is very rich in birdlife of nearly 10,00 different kinds of the world, 1300 species or about 13 percent of the World's birds, are found in the Indian sub continent. The main reason for the very rich birds life in India is the presence of varied habitats, from the hot arid deserts of Rajasthan to the thick tropical rain forests.

The avifauna of the Bihar and Jharkhand are poorly known and this fact is more appropriate for the Saranda Forest Division also. In the wildlife management, the birdlife were not given much of preference for management in previous Working Plans of the forest and this practice still continues in most of the forest areas. The Saranda Forest Division is no exception.

Except for the very brief and sketchy

description of few birds (by Mooney, 1937), this aspects of Forestry has never been given any importance by the foresters in the past and present work has been under taken with the mission to hitherto less studied (if not unexplored) birdlife of Saranda Forest Division, District West Singhbhum, Jharkhand state of India.

Study site

The intensive study site is located between $22^{\circ}0'$ to $22^{\circ}26'$ north and $85^{\circ}0'$ to $85^{\circ}26'$ east forming the Saranda Forest Division of Jharkhand state, comprising an area of approximately 857 km^2 , excluding areas of human habitation (Ag 1). The tract is mountainous and the larger valleys are occupied by village lands, while the forests occupy mostly higher grounds and tops of the hills. However, some of the valleys thus included have the best forests also. The lowest point, in the area about 250 metre elevation, is Samta Valley. The height of Chaibasa, the district head-quarters, is 250 metre.

The hill ranges have a certain parallelism from north-east to south-west, but often form a confused jumble in which it is difficult to detect any arrangement. The gradients are gentle or steep. The highest peak, 1018 metre high called Kiriburu is in the Karampada block near the Keonjhar boundary.

The principal rivers are the north and south Karo, flowing south and north, respectively to the Koel river, which flows west into Sundergarh and joins the Brahmini, and the Koina which also flows north and then west to the Koel. The Bengal-Nagpur Railway

passes over the watershed of the Koel and Kharkai at the tunnel near Goilkera station (about 4,00 metre elevation).

The catchment areas being still forest clad the principal rivers above mentioned contain water throughout the year; this is usually contained in long, deep pools. Separated by rocks and sandbars over which the flow may be scarcely perceptible. All the rivers are very circuitous and, inside the forests, have generally narrow valleys with steep to precipitous slopes on at least one of their sides. Many of the streams have during their course to descend steep scarps 10 meter to 60 meter high. These conditions often render movement up the valleys very difficult or impossible.

The majority of the vegetation can be classified broadly under tropical moist and dry deciduous categories. While the former constitute far and wide, later is confined mostly on the ridges. The forest of Saranda is well known for its best quality Sal (*Shorea robusta*) forest, a predominant species occurring in all types of Soil. In favorable localities it attains a height of 40-45 meters. According to Champion and Seth (1968) the forest types are classified as: northern dry mixed deciduous forests, dry peninsular Sal forests, moist peninsular Sal forests, moist mixed deciduous forests, northern tropical evergreen and semi evergreen forests and dry deciduous scrub forest.

On legal count the forests of Saranda Division is constituted by approximately 817 km² of reserve forests, 39 km² of protected forests and 1 km² of unclassed forests. At present there is no Protected Area in this region despite large availability of contiguous forests with other two adjoining forest divisions i.e. Kolhan and Porahat. Though

there was an old game sanctuary at Tholkobad but this was never renotified under the provisions of Wildlife (Protection) Act, 1972. With the advent of the Project Elephant in 1993 this whole area has been identified as "Singhbhum Elephant Reserve" for the conservation of elephant in the forest landscape forming Singbhum Forest Division as its "Core".

The major threats to flora and fauna due to biotic interference in this region are : encroachment of forest land, illicit felling of forest, poaching and tribal hunt, iron ore mining and its associated environmental problems, forest fire and grazing (Chouwdhury et al., 1985) The study area suffer from all these threats in the elephant habita, yet iron ore mining and it associated environmental problems are the major issues of Saranda Forest Division only.

Taxonomy and Nomenclature

In the present work, "Taxonomy" and "Nomenclature" has largely been followed *An Annotated checklist of the birds of the Oriental Region* by Tim Inskipp, Nigel Lindsey and William Duckworth (1996).

For the identification of the birds; (A) R. Grimmet, C. Inskipp and T. Inskipp. Birds of the Indian subcontinent (1988), (B) R. Grimmet, Inskipp T. Birds of Northern India (2003), (C) S. Ali, The Book India Birds (1979) and (D) K. Kazmierczak, R. Singh A Birdwatcher Guide to India (2001) were consulted primarily after extensive field work in different parts of Saranda Forest Division. Due to problem of inaccessibility, and also by the extreme problem of "Naxalite" activities, many of the virgin and unexplored area of Saranda could not be entered upon. It is quite

possible many more species will be found in these areas to make the present work, more comprehensive.

Status of Birdlife, 50 years ago.

The avifauna of Saranda and to large extent of Singhbhum region is of great importance, because it lies in peninsular zoogeographical zone. A large number of peninsular birds occur in this location. Due to the proximity of the area to the plains of West Bengal, which are in the Indo Gangetic zoogeographical sub region, these are Indo-Gangetic birds. Many Assamese, Indo-Burmese and Indo-Malayan species also occur. The Central India species are well represented. Some birds found in the Himalaya and the Western Ghats are also found in Singhbhum. (RoyChowdhury 1956). The historical interest of the Singhbhum area (of which Saranda forms a part) in ornithology is the fact that it was one of those areas studied in detail very early, between 1833 and 1840 by Tickell. Many species not known before, were described by Tickell. Four of these might be mentioned here, the long tailed nightjar (*Caprimulgus macrurus*) the brown hawk-owl (*Ninox scutulatus*) purple wood pigeon. (*Columba punicea*) and Large green billed malkoha (*Rhopodytes tristis*)

The other prominent birds found were-

Teal

River tern

Jerdon's chloropsis/Gold fronted chloropsis,

Golden Oriole, Black headed oriole,

Larks, Yellow cheeked tit,

Wagtails, Black crested yellow bulbul,

Pipits, Pied hornbill,

Bee-eater,

Ashy-crowned finch lark (*Eremopteryx grisea*),

Indian robin,

Rebstart, Paradise fly catcher,

Woodpeckers, Scarlet minivet,

Lapwings,

Shrikes,

Dayal,

Crowpheasant,

Minivets,

Roy Chowdhury also categorised birds according to "Zoning" of jungle, the birds preferred.

Zone	Birds
1.	2.
Treetop	Black crested yellow bulbul
	Large racket tailed drongo
	Grackle
	Green pigeon
	Purple wood pigeon
Lower Canopy	Gray tit
	Iora,
	bulbul
	Flycatcher sparrow
	Yellow backed sunbird
	Purple rumped sunbird
Tree trunk	Woodpeckers
	Nuthach
Ground cover	Creeper and Pigmy woodpecker
	Babbler
	Bulbul
	Dayal
	Shama
	Black bird
	Thrush

Ground	Wagtail
	Pitta
	Sirkeer
	nightjar
	Peafowl
	Jungle fowl
	Partridges
	Courser
	Lapwing

Roychowdhury also categorized birds according to their status also,

Uncommon birds

Black bulbul
 Ashy swallow-shrike
 Black and red headed bunting
 Yellow backed sunbird
 Green-breasted pitta
 Forest eagle owl
 Green imperial pigeon
 The Indian Courser
 Rosy pastor

Birds of problematic status

Yellow breasted habbler (probably extinct)
 White winged wood duck (extinct)
 Jungle owlet
 White cheeked bulbul

Bird not seen

Great bustard (*choriotis nigriceps*)
 Likh floriken (*Syphoetides indica*)
 White winged wood duck (*Rhodonessa caryophyllocea*)
 Wood duck.

Result and discussion

After a extensive field visit of the area starting from May, 2001 to August, 2004, the author could sight or gather information about 277 species of birds, belonging to 98 groups in the territory of Saranda. Where, the author himself sighted the birds; it has been recorded with date and place in "Status" column. in case no comment is given in the "Status" column, the occurrence of the birds is derived from the sighting by other foresters, villagers. It is mentioned again here that many more species of birds are not there in this work as area could not be traversed intensively (leaving many tracts, inaccessible but rich in birdlife). It is hoped that this work will inspire the ornithological, bird watching enthusiasts to explore this relatively unattended but extremely rich birdlife habitat of the country. The Birds found have been categorised by their group; with their Common Name and Scientific Name along with their status.

Appendix-I
Check List of Birds, found in Saranda 2003-2004

Sl. No.	Group	Common Name	Scientific name	Status
1.	2.	3	4.	5.
01.	Nicobar scrubfowl, Snow cocks, partridges and francolins	1. Black Francolin 2. Painted Francolin 3. Grey Francolin	<i>Francolinus francolinus</i> <i>Francolinus pictus</i> <i>Francolinus Pondicerianus</i>	- - -
02.	Quails and Buttonguails	1. Common Quail 2. Rain Quail 3. Blue-Breasted Quail 4. Jungle Bush Quail 5. Small Button Quail 6. Yellow-Legged Button Quail 7. Barred Buttonquail 8. Painted Bush Quail	<i>Coturnix coturnix</i> <i>Coturnix coromandelica</i> <i>Coturnix chinensis</i> <i>Perdicola asiatica</i> <i>Turnix sylvatica</i> <i>Turnix tanki</i> <i>Turnix suscitator</i> <i>Perdicula ery-throrhyncha</i>	Common - - Common - - Sighted at Rabangda on 19-6-2004 -
03.	Partridges and Spurfowl	1. Red Spurfowl 2. Painted Spurfowl	<i>Galloperdix spadicea</i> <i>Galloperdix lunulata</i>	Sighted at Kumdi in July, 2003. Sighted at Kumdi in July, 2003
04.	<u>Pheasants</u>	1. Red Junglefowl 2. Indian Peafowl	<i>Gallus gallus</i> <i>Pavo cristatus</i>	Sighted at Braiburu in April, 2003. Sighted at Ghatkuri in July, 2003.
05.	Geese, Whistling-Ducks and Shelducks	1. Lesser Whistling-Duck 2. Ruddy Shelduck	<i>Dendrocygna javanica</i> <i>Tadorna ferruginea</i>	- Sighted at Chandil in July, 2003
06.	Dabbling Ducks	1. Common Teal 2. Garganey 3. Northern Pintail 4. Gadwall 5. Spot-Billed Duck	<i>Anas crecca</i> <i>Anas querquedula</i> <i>Anas acuta</i> <i>Anas Strepera</i> <i>Anas poecilorhyncha</i>	Common Common - Common -
07.	Diving Ducks	1. Red Crested Pochard 2. Common Pochard 3. Tufted Duck	<i>Rhodonessa rufina</i> <i>Aythya ferina</i> <i>Aythya falgula</i>	- Common -
08.	Yellow-Rumped Honeyguide and Woodpeckers	1. Eurasian Wryneck 2. Speckled Piculet 3. Rufous Woodpecker 4. Heart-Spotted Woodpecker	<i>Jynx torquilla</i> <i>Picumnus innominatus</i> <i>Celeus brachyurus</i> <i>Hemicircus canente</i>	- - Common Common
09.	Woodpeckers	1. Brown-Capped Pygmy Woodpecker 2. Fulvous-Breasted Woodpecker 3. Yellow-Crowned Woodpecker 4. Lesser Yellownape 5. Streak Throated Woodpecker	<i>Dendrocopos nanus</i> <i>Dendrocopos macei</i> <i>Dendrocopos mahrattensis</i> <i>Picus chlorolophus</i> <i>Picus xanthopygaeus</i>	- - - - -

	6. Grey Headed Woodpecker	<i>Picus canus</i>	-
	7. Black-Rumped Flameback	<i>Dinopium benghalense</i>	Sighted at Andua on 09-07-04
	8. Greater Flameback	<i>Chrysocolaptes lucidus</i>	-
	9. White-Naped Woodpecker	<i>Chrysocolaptes festivus</i>	-
10. Barbets	1. Brown-Headed Barbet	<i>Megalaima zeylanica</i>	-
	2. Coppersmith Barbet	<i>Megalaima haemacephala</i>	Sighted at Baraiburu in June, 2003
	3. Lineated Barbet	<i>Megalaima lineata</i>	-
11. Small and Medium-Sized Hornbills	1. Indian Grey Hornbill	<i>Ocyrceros birostris</i>	Common
	2. Malabar Pied Hornbill	<i>Anthraccoceros coronatus</i>	Sighted at Hendekuli on June, 2002
	3. Oriental Pied Hornbill	<i>Anthraccoceros albirostris</i>	Sighted at Hendekuli in June, 2002
12. Common Hoopoe, Trogons and Rollers.	1. Common Hoopoe	<i>Upupa epops</i>	Common
	2. Malabar Trogon	<i>Harpactes fasciatus</i>	-
	3. Indian Roller	<i>Coracias benghalensis</i>	Common
13. King Fishers	1. Common King Fisher	<i>Alcedo atthis</i>	Sighted at Ankua on 04-07-04
	2. Stork-Billed King Fisher	<i>Halcyon capensis</i>	-
	3. White Throated King Fisher	<i>Halcyon smymensis</i>	Common
	4. Pied Kind Fisher	<i>Ceryle rudis</i>	Common
14. Bee-Eaters	1. Blue Bearded Bee Eater	<i>Nyctyornis athertoni</i>	Common
	2. Green Bee Eater	<i>Merops orientalis</i>	Sighted at Tambo on 25-07-04
	3. Blue Tailed Bee Eater	<i>Merops philippinus</i>	-
	4. Chestnut-Headed Bee Eater	<i>Merops leschenaulti</i>	-
15. Cuckoos	1. Pied Cuckoo	<i>Clamator jacobinus</i>	-
	2. Common Hawk Cuckoo	<i>Hierococcyx varius</i>	Common
	3. Indian Cuckoo	<i>Caculus micropterus</i>	Common
	4. Eurasian Cuckoo	<i>Cuculus canorus</i>	-
	5. Banded Bay Cuckoo	<i>Cacomantis sonneratii</i>	-
	6. Grey-Bellied Cuckoo	<i>Cacomantis passerinus</i>	-
16. Cuckoos and Coucals	1. Asian Koel	<i>Eudynamis scolopacea</i>	Common
	2. Green-Billed Malkoha	<i>Phaenicophaeus tristis</i>	-
	3. Blue-Faced Malkoha	<i>Phaenicophaeus viridirostris</i>	-
	4. Sirkeer Malkoha	<i>Phaenicophaeus leschenaultii</i>	Sighted at Noamundi on 6-8-04
	5. Greater Coucal	<i>Contropus sinensis</i>	Sighted at Braiburu in June, 2004
	6. Lesser Coucal	<i>Contropus bengalensis</i>	Common
17. Hanging Parrots and Parakeets	1. Vernal Hanging Parrot	<i>Loriculus vernalis</i>	-
	2. Alexandrine Parakeet	<i>Psittacula eupatria</i>	Common
	3. Rose-Ringed Parakeet	<i>Psittacula krameri</i>	Common
	4. Plum-Headed Parakeet	<i>Psittacula cyanocephala</i>	Common
18. Swiftlets and Needletails	1. White-Rumped Needletail	<i>Zoonavena sylvatica</i>	Common
19. Swifts	1. Asian Palm Swift	<i>Cypsiurus balasiensis</i>	Common

	2. House Swift	<i>Apus affinis</i>	Common
	3. Alpine Swift	<i>Tachymarptis melba</i>	-
	4. Crested Treeswift	<i>Hemiprocne coronata</i>	Sighted at Tholkobad.
20. Small and Medium Sized Owls	1. Oriental Scops Owl	<i>Othus sunia</i>	-
	2. Collared Scops Owl	<i>Othus bakkamoena</i>	Sighted at Kumdi
	3. Barn Owl	<i>Tyto alba</i>	Sighted at Dalma in May, 2004
21. Large Owls	1. Eurasian Eagle Owl	<i>Bubo bubo</i>	Sighted at Kumdi
	2. Brown Fish Owl	<i>Ketupa zeylonensis</i>	Sighted at Kumdi
	3. Dusky Eagle Owl	<i>Bubo coromandus</i>	-
	4. Mottled Wood Owl	<i>Strix ocellata</i>	-
	5. Brown Wood Owl	<i>Strix leptogrammica</i>	-
22. Small and Medium Sized Owls	1. Jungle Owlet	<i>Glaucidium radiatum</i>	Sighted at Darampada
	2. Spotted Owlet	<i>Athene brama</i>	Sighted at Karampada
	3. Brown Hawk Owl	<i>Ninox scutulata</i>	-
	4. Short Eared Owl	<i>Asio flammeus</i>	-
23. Frogmouths and Nightjars	1. Grey Nightjar	<i>Caprimulgus indicus</i>	Sighted at Samta in May, 2003
	2. Large Tailed Nightjar	<i>Caprimulgus macrurus</i>	Sighted at Samta in May, 2003
	3. Jerdon's Nightjar	<i>Caprimulgus atripennis</i>	-
	4. Indian Nightjar	<i>Caprimulgus asiaticus</i>	Common
	5. Savanna Nightjar	<i>Caprimulgus affinis</i>	-
24. Pigeons	1. Rock Pigeon	<i>Columba livia</i>	Common
	2. Pale Capped Pigeon	<i>Columba punicea</i>	-
	3. Green Imperial Pigeon	<i>Ducula aenea</i>	-
25. Doves	1. Oriental Turtle Dove	<i>Streptopelia orientalis</i>	Common
	2. Laughing Dove	<i>Streptopelia senegalensis</i>	-
	3. Spotted Dove	<i>Streptopelia chinensis</i>	Common
	4. Red Collared Dove	<i>Streptopelia tranquebarica</i>	-
	5. Eurasian Collared Dove	<i>Streptopelia decaocto</i>	-
	6. Emerald Dove	<i>Chalcophaps indica</i>	Common
26. Green Pigeons	1. Yellow Footed Green Pigeon	<i>Treron phoenicoptera</i>	Sighted at Gindung on 04-07-2004
	2. Orange Breasted Green Pigeon	<i>Treron bicincta</i>	Sighted at Kolbonga on 04-07-2004
27. Cranes	1. Sarus Crane	<i>Grus antigone</i>	-
	2. Common Crane	<i>Grus grus</i>	-
28. Masked Finfoot, Rails and Crakes	1. Brown Crake	<i>Amaurornis akool</i>	-
	2. White-Breasted Waterhen	<i>Amaurornis phoenicurus</i>	-
29. Crakes and other Rallids	1. Watercock	<i>Gallicrex cinerea</i>	-
	2. Purple Swamphen	<i>Porphyrio porphyrio</i>	-
	3. Common Moorhen	<i>Gallinula chloropus</i>	-
	4. Common Coot	<i>Fulica atra</i>	-
30. Sandgrouse	1. Chestnut Bellied Sandgrouse	<i>Pterocles exustus</i>	-
	2. Painted Sandgrouse	<i>Pterocles indicus</i>	-

31.	Eurasian Wood-cock and Snipes	1. Pintail Snipe 2. Great Snipe 3. Jack Snipe	<i>Gallinago stenura</i> <i>Gallinago media</i> <i>Lymnocyrtus minimus</i>	- - -
32.	Godwits and Curlews	1. Eurasian Curlew	<i>Numenius arquata</i>	Sighted at Chainpur in 1995
33.	Tringa Sandpipers	1. Common Greenshank 2. Green Sandpiper 3. Wood Sandpiper	<i>Tringa nebularia</i> <i>Tringa ochropus</i> <i>Tringa glareola</i>	- - -
34.	Miscellaneous Waders	1. Common Sandpiper	<i>Actitis hypoleucos</i>	-
35.	Stints and Sanderling	1. Little stint 2. Temminck's stint	<i>Calidris minuta</i> <i>Calidris temminckii</i>	- -
36.	Phalaropes, Coursers and Eurasian Thick-Knee	1. Indian Courser 2. Eurasian Thick-knee	<i>Cursorius coromandelicus</i> <i>Burhinus oedicephalus</i>	? -
37.	Miscellaneous Waders, Jacanas	1. Black winged Stilt 2. Pheasant Tailed Jacana 3. Bronze Winged Jacana	<i>Himantopus himantopus</i> <i>Hydrophasianus chirurgus</i> <i>Metopidius indicus</i>	Sighted at Tholkobad, ligirda Sighted at Tholkobad, ligirda
38.	Pratincofes and Plovers	1. Small Pratincole	<i>Glareola lactea</i>	-
39.	Plovers	1. Little Ringed Plover 1. Kentish Plover	<i>Charadrius dubius</i> <i>Charadrius alexandrinus</i>	- -
40.	Lapwings	1. Yellow-Wattled Lapwing 2. River Lapwing 3. Red-Wattled Lapwing	<i>Vanellus Malarbaricus</i> <i>Vanellus duvaucelii</i> <i>Vanellus indicus</i>	- - -
41.	Large Terns	1. River Tern	<i>Sterna aurantia</i>	-
42.	Small Terns	1. Black-Bellied Tern 2. Whiskerd Tern	<i>Sterna acuticauda</i> <i>Chlidonias hybridus</i>	- -
43.	Kites, Bazas and Osprey	1. Osprey 2. Black Kite 3. Brahminy Kite 4. Black Shouldered Kite	<i>Pandion haliaetus</i> <i>Milvus migrans</i> <i>Haliastur Indus</i> <i>Elanus caeruleus</i>	- - - Sighted at Tambo on 20-05-2004
44.	Sea Eagles and Fish Eagles	1. Pallas's Fish Eagle	<i>Haliaeetus leucoryphus</i>	-
45.	Vultures	1. Egyptiav Vulture 2. White-Rumped Vulture 3. Long-Billed Vulture 4. Red Headed Vulture	<i>Neophron percnopterus</i> <i>Gyps benghalensis</i> <i>Gyps indicus</i> <i>Sarcogyps calvus</i>	Sighted at Karampada in May, 2003 Common Common -

46. Short Toed Snake Eagle, Serpent Eagles and Black Eagles	1. Short-Toed Snake Eagle 2. Crested Serpent Eagle	<i>Circaetus gallicus</i> <i>Spilornis cheela</i>	- Sighted at Tholkobad in 2002
47. Harriers	1. Eurasian Marsh Harrier 2. Pied Harrier 3. Pallied Harrier	<i>Circus aeruginosus</i> <i>Circus melanoleucos</i> <i>Circus macrourus</i>	- - -
48. Accipiters	1. Shikra	<i>Accipiter badius</i>	Common
49. Buzzards and Oriental Honey-Buzzard	1. Oriental Honey-Buzzard 2. White-Eyed Buzzard	<i>Pernis ptilorhyncus</i> <i>Butastur teesa</i>	- -
50. Aquila Eagles	1. Lesser Spotted Eagle 2. Steppe Eagle	<i>Aquila pomarina</i> <i>Aquila nipalensis</i>	- -
51. Eagles and Hawk Eagles	1. Bonelli's Eagle 2. Booted Eagle 3. Changeable Hawk Eagle	<i>Hieraaetus fasciatus</i> <i>Hieraaetus pennatus</i> <i>Spizaetus cirrhatus</i>	- - -
52. Falconets and Falcons	1. Common Kestrel 2. Red-Necked Falcon	<i>Falco tinnunculus</i> <i>Falco chicquera</i>	Common -
53. Large Falcons	1. Laggar Falcon 2. Peregrine Falcon	<i>Falco jugger</i> <i>Falco peregrinus</i>	Common -
54. Grebes and Loons	1. Little Grebe	<i>Tachybaptus ruficollis</i>	Sighted at Manoharpur
55. Darter and Cormorants	1. Darter 2. Little Cormorant 3. Indian Cormorant 4. Great Cormorant	<i>Anhinga melanogaster</i> <i>Phalacrocorax niger</i> <i>Phalacrocorax fuscicollis</i> <i>Phalacrocorax carbo</i>	Common Common Common -
56. Egrets and Pond Herons	1. Little Egret 2. Great Egret 3. Intermediate Egret 4. Cattle Egret 5. Indian Pond Heron	<i>Egretta garzetta</i> <i>Casmerodius albus</i> <i>Mesophoyx intermedia</i> <i>Bubulcus ibis</i> <i>Ardeola grayii</i>	Sighted at Baraiburu on 23-06-2004 Sighted at Makranda on 03-07-2004 Sighted at Pachpaia on 03-07-2004 Common Common
57. Large Herons	1. Grey Heron 2. Purple Heron	<i>Ardea cinerea</i> <i>Ardea purpurea</i>	Common Common
58. Bitterns and Night Herons	1. Little Heron 2. Black Crowned Night Heron	<i>Butorides striatus</i> <i>Nycticorax nycticorax</i>	Common Common
59. Flamingos, Ibises and Eurasian Spoonbill	1. Black Ibis	<i>Pseudibis papillosa</i>	Sighted at Manoharpur on 27-04-2004
60. Storks	1. Asian Openbill	<i>Anastomus oscitans</i>	Sighted at Kuju/Timra
61. Pittas, Broadbills, Asian Fairy Blue-	1. Blue-Winged Leafbird 2. Golden-Fronted Leafbird	<i>Chloropsis cochinchinensis</i> <i>Chloropsis aurifrons</i>	Common -

bird and Leafbirds

62.	Shrikes	1. Brown Shrike 2. Bay-Backed Shrike 3. Long Tailed Shrike 4. Southern Grey Shrike	<i>Lanius cristatus</i> <i>Lanius vittatus</i> <i>Lanius schach</i> <i>Lanius meridionalis</i>	- - - -
63.	Jays, Magpies, Treepies and Mangrove Whistler	1. Rufous Treepie	<i>Dendrocitta vagabunda</i>	-
64.	Black Billed Magpie, Hume's Groundpecker Spotted Nut-Cracker, Choughs and Crows	1. House Crow 2. Large Billed Crow	<i>Corvus Spelendens</i> <i>Corvus macrorhynchos</i>	Common -
65.	Woodswallows, Orioles and Cuckooshrikes	1. Ashy Woodswallow 2. Eurasian Golden Oriole 3. Black Wooded Oriole 4. Large Cuckooshrike 5. Black Headed Cuckooshrike	<i>Artamus fuscus</i> <i>Oriolus oriolus</i> <i>Oriolus xanthornus</i> <i>Coracina macei</i> <i>Coracina melanoptera</i>	- Sighted at Chiriya on 3-7-2004 Common - -
66.	Minivets, Bar-Winged Flycatchers, Shirike and Fantails	1. Small Minivet 2. Scarlet Minivet 3. White-Browed Fantail	<i>Pericrocotus cinnamomeus</i> <i>Pericrocotus flammeus</i> <i>Rhipidura aureola</i>	- Sighted at Timra on 22-07-2004 -
67.	Drongos	1. Black Drongo 2. Ashy Drongo 3. White-Bellied Drongo 4. Greater Racket-Tailed Drongo	<i>Dicrurus macrocercus</i> <i>Dicrurus leucophaeus</i> <i>Dicrurus caerulescens</i> <i>Dicrurus paradiseus</i>	Common - - -
68.	Black-Naped Manarch, Asian Paradise-Fly-Catcher, Ioras, Woodshrikes, Bohemian Waxwing and Dippers	1. Black-Naped Monarch 2. Asian Paradise Flycatcher 3. Common Iora 4. Common Woodshrike 5. Large Woodshrike	<i>Hypothymis azurea</i> <i>Terpsiphone paradise</i> <i>Aegithina tiphia</i> <i>Tephrodornis pondicerianus</i> <i>Tephrodornis gularis</i>	- Sighted at Barkela June, 04 Common Common Sighted at Garhwal 1995-96
69.	Rock Thrushes and Whistling Thrushes	1. Blue Rock Thrush 2. Malabar Whistling Thrush	<i>Monticola solitarius</i> <i>Myophonus horsfieldii</i>	Common -
70.	Zoothera Thrushes	1. Orange-Headed Thrush 2. Scaly Thrush	<i>Zoothera citrina</i> <i>Zoothera dauma</i>	- -
71.	Flycatchers	1. Asian Brown Flycatcher 2. Red-Throated Flycatcher	<i>Muscicapa dauurica</i> <i>Ficedula parva</i>	- -
72.	Chats	1. Oriental Magpie Robin 2. Indian Robin	<i>Copsychus saularis</i> <i>Saxicoloides fulicata</i>	Sighted on 25-04-2004 common

73. Cochoas and Bushchats	1. Brown Rock Chat	<i>Cercomela fusca</i>	Sighted at Tambo on 23-04-2004
74. Starlings	1. Chestnut-Tailed Starling	<i>Sturnus malabaricus</i>	Sighted at Manoharpur on 27-04-2004
	2. Brahminy Starling	<i>Sturnus pagodarum</i>	Sighted at Manoharpur on 25-04-2004
	3. Asian Pied Starling	<i>Sturnus contra</i>	Sighted at Manoharpur on 25-04-2004
75. Mynas	1. Bank Myna	<i>Acridotheres ginginianus</i>	Common
	2. Common Myna	<i>Acridotheres tristis</i>	Common
	3. Jungle Myna	<i>Acridotheres fuscus</i>	Common
	4. Hill Myna	<i>Gracula religiosa</i>	Sighted at Hendekuli in April, 2004
76. Bulbuls	1. Black-Crested Bulbul	<i>Pyenonotus melanicterus</i>	-
	2. Red-Whiskered Bulbul	<i>Pycnonotus jocosus</i>	Common
	3. White-Browed Bulbul	<i>Pycnonotus letcolus</i>	-
77. Prinias	1. Rufous-Fronted Prinia	<i>Prinia buehneri</i>	-
	2. Grey-Breasted Prinia	<i>Prinia hodgsonii</i>	-
78. Prinias, Cisticolas, White Eyes and Tesias	1. Jungle Prinia	<i>Prinia sylvatica</i>	Common
	2. Plain Prinia	<i>Prinia inornata</i>	-
	3. Isha Prinia	<i>Prinia socialis</i>	-
	4. Zitting Cisticola	<i>Cisticola juncidis</i>	-
	5. Oriental-White Eye	<i>Zosterops Palpebrosus</i>	-
79. Large Acrocephalus Warblers and Grassbirds	1. Clamorous Reed Warbler	<i>Acrocephalus stentoreus</i>	Common
80. Hippolais and Sylvia Warblers	1. Lesser Whitethroat	<i>Sylvia curruca</i>	-
	2. Orophean Warbler	<i>Sylvia hortensis</i>	-
81. Tailorbirds, White-Browed Tit Warbler and Phylloscopus Warblers	1. Common Tailorbird	<i>Orthotomus sutorius</i>	Common
	2. Common Chiffchaff	<i>Phylloscopus collybita</i>	Common
	3. Dusky Warbler	<i>Phylloscopus fuscatus</i>	-
82. Phylloscopus Warblers	1. Tickell's Leaf Warbler	<i>Phylloscopus affinis</i>	-
	2. Hume's Warbler	<i>Phylloscopus humei</i>	-
	3. Greenish Warbler	<i>Phylloscopus trochiloides</i>	-
83. Babblers, including Scimitar Babblers	1. Puff-Throated Babbler	<i>Pellomeum ruficeps</i>	-
	2. Indian Scimitar Babbler	<i>Pomatorhinus horsfieldii</i>	-
84. Babblers	1. Tawny-Bellied Babbler	<i>Dumetia hyperythra</i>	-
	2. Yellow-Eyed Babbler	<i>Chrysomma sinense</i>	-
	3. Striped Tit Babbler	<i>Macronous gularis</i>	-
85. Turdoides Babblers, Babaxes and Mesias	1. Common Babbler	<i>Turdoides Caudatus</i>	Common
	2. Large Grey Babbler	<i>Turdoides malcolmi</i>	-

86.	Turdoides Babblers, Babaxes and Mesias	1. Jungle Babbler	<i>Turdoides striatus</i>	Common
87.	Fulvettas, Yuhinas and Fire Tailed Myzornis	1. Brown Cheeked Fulvetta	<i>Alcippe poioicephala</i>	-
88.	Larks	1. Singing Bushlark	<i>Miraфра cantillans</i>	-
		2. Indian Bushlark	<i>Miraфра erythroptera</i>	-
		3. Rufous-Winged Bushlark	<i>Miraфра assamica</i>	-
		4. Ashy-Crowned Sparrow Lark	<i>Eremopterix grisea</i>	-
		5. Rufous-tailed Lark	<i>Ammomanes phoenicurus</i>	-
		6. Greater Short-Toed Lark	<i>Calandrella brachy dactyla</i>	-
		7. Sand Lark	<i>Calandrella raytal</i>	-
		8. Oriental Skylark	<i>Alauda gulgula</i>	-
89.	Flowerpeckers and Sunbirds	1. Thick-Billed Flowerpecker	<i>Dicaeum agile</i>	-
		2. Pale-Billed Flowerpecher	<i>Dicaeum</i>	-
		3. Purple-Rumped Sunbird	<i>erythrorynchos</i>	-
			<i>Nectarinia zeylonica</i>	-
90.	Sunbirds	1. Purple Sunbird	<i>Nectarnia asiatica</i>	Common
91.	Sparrows and Snowfinches	1. House Sparrow	<i>Passer domesticus</i>	Common
92.	Large Pipits	1. Richard's Pipit	<i>Anthus richardi</i>	-
		2. Paddyfield Pipit	<i>Anthus rufulus</i>	-
		3. Tawny Pipit	<i>Anthus campestris</i>	-
		4. Long-Billed Pipit	<i>Anthus similis</i>	-
93.	Pipits	1. Tree pipit	<i>Anthus trivialis</i>	Common
		2. Olive-Backed Pipit	<i>Anthus hodgsoni</i>	-
94.	Weavers and Avadavat	1. Black-Breasted Weaver	<i>Ploceus benghalensis</i>	-
		2. Baya Weaver	<i>Ploceus philippinus</i>	Common
		3. Red Avadavat	<i>Amandava amandava</i>	Common
95.	Munias and Finches	1. Black Headed Munia	<i>Lonchura malacca</i>	-
		2. Indian Silverbill	<i>Lonchura malabarica</i>	Sighted at Tambo on 23-04-2004
		3. White Rumped Munia	<i>Lonchura striate</i>	Sighted at Chiriya on 13-08
		4. Scaly Breasted Munia	<i>Longhura punctulata</i>	Sighted at Tambo on 23-04-2004
96.	Finches, Including Rosefinches	1. Common Rosefinch	<i>Carpodacus erythrinus</i>	Sighted at Chiriya on 15-12-2003
97.	Buntings	1. Crested Bunting	<i>Melophus lathami</i>	-

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A ROAD MAP FOR CONSERVATION IN UTTARANCHAL

A.J.T. Johnsingh¹

The enchanting state of Uttaranchal, carved out of Uttar Pradesh on 9th November 2000, has a total area of ca. 53,485 km² with a population density of 160 persons/ km², much lower than the national average of 324/ km². This young state can take pride in the fact that 13.42% of its area is under protected areas. The state has varied landscapes: snow-capped and conifer forest covered mountains in the north, forest covered foothills with numerous perennial rivers and streams, locally known as the *bhabar* tract which includes the Himalayan foothills and the Shivalik range. As a result, the land is home to a variety of fascinating wildlife such as the golden mahseer (*Tor putitora*), king cobra (*Ophiophagus hanna*), Himalayan monal (*Lophophorus impejanus*), great hornbill (*Buceros bicornis*), Himalayan tahr (*Hemitragus jemlahicus*), bharal (*Pseudois nayaur*), Himalayan musk deer (*Moschus chrysogaster*), goral (*Nemorhaedus goral*), elephant (*Elephas maximus*), snow leopard (*Panthera uncia*), leopard (*P. pardus*), black bear (*Ursus thibetanus*), and tiger (*P. tigris*). All across their range, most of these species are endangered.

The potential of this state, with about 800 kilometers of riverine habitat, can only be surpassed by Arunachal Pradesh in terms of golden mahseer conservation. The mountains, bedecked with the scarlet flowers

of rhododendron (*Rhododendron arboreum*) in the summer months, can be a veritable home to many forms of pheasants, mountain ungulates and carnivores, provided poaching for trade is eliminated and hunting for the pot is brought under control. The *bhabar* forests of this state, ca. 7,500 km², extending between Yamuna and Sharda rivers (Fig. 1.), can easily support a population of about 1000 elephants and 200 tigers as long as this large habitat, now fragmented in three blocks, is managed and protected as one continuous habitat for wildlife. Six villages, *gujjar* settlements and encroachments need to be moved away from the main wildlife habitat which goes along the *bhabar* tract. Although the conservation of these habitats can eventually bring in immense benefits through well-planned ecotourism programmes that are rapidly catching up in the state, initial conservation efforts would need a substantial amount of funds.

The state gets various forms of assistance from the Government of India to manage Corbett Tiger Reserve (1286 km²) and Rajaji National Park (820 km², RNP). Most of us know that RNP is the richest Park in India, with a corpus of Rs. 50 crores (which now stands at 57 crores with the addition of interest gained) given by the National Power Corporation of India to compensate the loss of trees and habitat which arose as a result of transmission of the hydel power from the Tehri

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dam up in the Garhwal Himalaya to the plains through the Park. It should be emphasized that Uttarakhand Government has the potential to raise significant amount of money for conservation through the establishment of a **Pilgrims Conservation Fund**. Uttarakhand, being the Dev Bhoomi of northern India, is visited by more than one crore (10 million) pilgrims every year. It is suggested that each pilgrim entering Uttarakhand should be taxed a minimum "conservation fee" of Rs. 10/= (rupees ten only). This fund, every year, would add up to a little over two million US dollars, which should be effectively managed by a small, efficient and dedicated team of trustees. This fund, which is bound to grow from year to year, and other assistance available from Government of India should be used to:

- Strengthen *Van Panchayats* so that villagers can protect forests and wildlife around their homesteads and protect their fields from crop-raiding ungulates using rubble walls wherever needed.
- Pay for volunteers from *Van Panchayats*, to patrol the mountainous terrain with the wildlife guards, warding off poachers who kill animals such as musk deer and black bear for trade and indulge in large scale collection of medicinal plants (e.g. *Cordyceps sinensis*, *Picrorhiza kurroa*, *Rheum australe*). Rawat (2005) suggests measures for protecting and managing medicinal and aromatic plants in Uttarakhand.
- Pay for volunteers from villages to protect the snow trout (*Schizothorax spp*), Indian trout (*Barilius bola*) and mahseer spawning habitats from

dynamiting, poisoning and gill netting during and soon after the rains (July-October). Golden mahseer is a peerless resource which the state should assiduously protect.

- Strengthen the anti-poaching unit of the Uttarakhand Forest Department. Promote gun replacement programme (Johnsingh and Negi 2003). Take special measures to wean *Kanjars* and *Rai Sikhs* from poaching. *Rai Sikhs* brew liquor in the forests, have killed off almost all the tuskers in the area, hunt sambar, an important prey species of tiger, with dogs and occasionally waylay people who carry provisions through the forest. This menace should be removed from the forest forever.
- Permit the villagers to kill wild pigs (*Sus scrofa*) when they raid the crops and cause enormous financial loss to the poor villagers but get an assurance from the people that they will not venture into the forest and kill species such as sambar (*Cervus unicolor*), chital (*Axis axis*), barking deer (*Muntiacus muntjak*), goral and wild pigs. The best deterrent to leopard-human conflict is the abundance of wild ungulate prey. There is no report of leopards attacking humans in Bhutan, although hamlets are in the middle of forests (Johnsingh and Yonten 2004). The major reason for this could be that there is absence of rampant poaching of wild ungulates and the forests may have sufficient prey such as barking deer, sambar,

serow (*Capricornis sumatraensis*) and goral.

- Relocate six villages, *gujjar* settlements and encroachers. The villages suggested for relocation are Kunaun *goth*, Gangabhogpur *Malla*, Gangabhogpur *Thalla*, Ringora, Amdanda and Tedha. Resettlement of the first three will significantly strengthen conservation on the left bank of the Ganga, leading to the establishment of nearly 300 km² (Gohri, Chilla and Shyampur ranges) of disturbance-free habitat. This habitat is connected to the 1500 km² tiger–elephant habitat in and around Corbett Tiger Reserve by the 200 km² Rajaji–Corbett corridor (Laldhang and Kotdwar ranges of Lansdowne Forest Division, 430 km²). This tract of nearly 2000 km² will ensure the future of tiger and elephant in Uttaranchal for decades to come. Barkot range in Dehra Dun Forest Division (510 km²), which has almost lost all its large mammals, except a herd of 20-30 elephants, as a result of poaching and enormous wood cutting from Rishikesh township, should be used for resettling the first three villages. Relocation of the other three villages would significantly strengthen the connectivity between Corbett Tiger Reserve and Ramnagar Forest Division (490 km²), across the Kosi river. Sufficient land is available in Gabua forest patch (13 km²) in Terai West Forest Division (350 km²) to house these villages. Our studies show

that areas intensively grazed by cattle are avoided by elephant groups (Williams *et al* 2005) and therefore relocation of *gujjars* and elimination of cattle grazing from key wildlife areas is a must. Uttaranchal (UA) Government should help Uttar Pradesh (UP) to resettle *gujjars* from Shivalik FD by providing sufficient land and UP, in turn, should help UA to evict the encroachers from UP part of Kalagargh township.

- Secure welfare measures such as schools, hospitals, water supply for drinking and cultivation, electricity and all-weather roads in the colonies of resettled *gujjars*. They should be convinced to limit their families, educate their children and trained to cultivate the land and maintain a few high milk yielding buffaloes that can be supported by the produce of the land. Evil-doers should be kept away from the *gujjar* colonies. Otherwise, one day, the *gujjars* would end up as labourers on their own valuable land allotted by the Government.
- Remove encroachments. The encroachments that need immediate attention are the ashram in Sidh *sot* in the heart of Shyampur range, encroachments on the left bank of the Ganga near Shyampur range, and Sundar *khal* and the Indian Medicines Pharmaceutical Corporation Limited (which may be a Government approved encroachment) in Ramnagar Forest Division. Removal of the first two would significantly strengthen the

300 km² conservation area suggested on the left bank of the Ganga. Resettlement of the last two will remove the cancerous growth near the famed Corbett Tiger Reserve. Sundar *khal* should be relocated in Gabua forest patch and the Pharmaceutical Corporation near Ramnagar. Remember wood cutting from Haridwar and adjacent settlements (encroachments) on the left bank of Ganges, if uncontrolled, will finish off Chilla range within a few years time. Already enormous harm has been done to Shyampur range by wood cutting. Terai East Forest Division (800 km²) has lost more than 60 km² to encroachment. Removal of these encroachments will be extremely challenging. Nevertheless, efforts should be made to establish the Kilpura-Khatima-Surai corridor so that the 30-50 elephants, presently pocketed in Haldwani Forest Division (750 km²), would revive their migration to Royal Sukhlaphanta Reserve in Nepal.

- Establish 1000 km² Nandhour - Ladhiya Conservation Reserve encompassing Danda, Nandhour and Jaulasal (north) ranges of Haldwani Forest Division; Dogaria and Boom ranges of Champawat Forest Division; Jaulasal (south) and Kilpura ranges of Terai East Forest Division and other adjacent potential forest blocks. Within this Conservation Reserve establish 400 km² Nandhour Valley National Park comprising the Danda, Nandhour and Jaulasal (north) ranges

of Haldwani Forest Division. Educate, encourage and support people to grow fodder and firewood species on their lands so that their impacts on the forests will be reduced. Create an effective anti-poaching force so that poaching, particularly killing of sambar with dogs, is totally eliminated leading to a rapid recovery of a minimum population of 50 tigers in this Reserve. Explore the possibility of recruiting and motivating 12-15 *Rai Sikh* youth from the 10-12 *Rai Sikh* villages in the anti-poaching force. *Rai Sikhs* have a stake in protecting this landscape as water for their prosperous agriculture comes only from these mountains.

- Control weeds and unpalatable species, convert monoculture plantations into polyculture plantations, particularly in Terai Central FD, that would benefit wildlife (Johnsingh and Negi 2003), and manage garbage. The flat areas in the *bhabar* tract have an abundance of various species of weeds and unpalatable species, which reduces the carrying capacity of the land for wild ungulates and carnivores. Even rivers, revered in the scriptures, are used for dumping garbage. Do not permit shops between Chopta and Tunganath and keep the trail free of garbage.

- Establish numerous nurseries to grow saplings of firewood species (e.g. *Holoptelia integrifolia*, *Acacia auriculiformis*), so that several square kilometers of fuel wood plantations are raised all along the

bhabar tract and sustainably harvested to meet the growing needs of the people living in the vicinity. Md. Abdullah Abraham Hossain (Trainee Officer XXVII Post Graduate Diploma in Wildlife Management, Wildlife Institute of India) informs that in Bangladesh bulk of the firewood for the high density human population (ca. 1000/km²) comes from *A. auriculiformis* plantations. The nurseries should also be used to grow forage species such as *Dendrocalamus strictus*, *Zizyphus mauritiana* and *Bridelia retusa* for 3-4 years. The saplings of the forage species should be planted in all possible areas, at the onset of rains, in the midst of dense *Lantana* patches which would serve as biofences. All the above programmes would generate thousands of jobs for the men and women of Uttaranchal.

- Rhesus macaques cause enormous problems to people. By feeding on eggs, chicks and even adults they decimate birdlife. Tiger and leopard seldom feed on rhesus. Declare it a vermin. Ban feeding and vasectomize the males.
- Put up wildlife and conservation related signs in Hindi and English, for the benefit of locals as well as wildlife tourists from abroad and other states. Regulate wildlife tourism in Rajaji NP.

The fund, which would grow bigger and bigger, if assiduously managed, would help Uttaranchal Government to establish and manage the vital Chilla-Motichur corridor

across the Ganga as early as possible. One should remember that the plan to establish this corridor is on the anvil since 1984, and yet we have miles to go before the corridor is fully established and becomes functional for the unhindered movement of large mammals. Hopefully, the Government will eventually even stop boulder mining in Gola river, where thousands of labourers from eastern Uttar Pradesh and Bihar are required to stay, leading to the decimation of the forests of Chakata, Gola, Dowli and Tanda ranges between Haldwani and Lal Kuan for their firewood and small timber needs. This will increase the possibility of restoring the habitat connectivity between Terai Central (400 km²) and Terai East Forest Divisions for elephant and tiger movement. The annual revenue the Government gets now (about Rs. 50 crores) through boulder mining in Gola river may be high, but this money comes at a great cost of growing ecological degradation of about 300 km² area between Haldwani and Lal Kuan, and should be stopped. The Government of India could intervene to stop this ecological degradation and restore connectivity between Terai Central and Terai East forest divisions, thereby making Uttaranchal a proud possessor of ca. 7500 km² of continuous elephant and tiger habitat between the Yamuna and Sharda rivers, something that would be unmatched by any other state in the Himalayan foothills. The Government of India could come up with sufficient financial assistance to Uttaranchal to compensate for the loss of finance to the state from the stopping of boulder mining. When Uttaranchal becomes financially richer, with the sale of hydel power, which is likely to happen in a few years' time, this specific assistance of the Government of India could be withdrawn.

Johnsingh *et al.* (2004) discuss most of the above points in detail.

Postscript: Lessons from Rajaji National Park

I have been a regular visitor to Rajaji NP since March 1985, when I joined the Wildlife Institute of India. In the company of my colleagues (G.S. Rawat, S.P. Goyal and Bivash Pandav) and students I have walked through most of the Park. Little more than a decade ago, it was common to see several groups of sambar on the hill slopes in the Dholkhand range that we frequented. On winter nights, whenever we stayed at the Dholkhand forest bungalow, we have often heard, with rapt attention, the haunting *A-oongh A-congh* of tigers echoing through the mist-shrouded forests. Over the years, tiger calls have become extremely rare and sambar no longer occurs in abundance as in the past. As a result, there was growing concern that the Sariska tragedy may be repeated in the forests west of the Ganga where the western portion of Rajaji NP is situated, not due to poaching but due to growing disturbances and lack of food for the tiger.

Fortunately, our fears seem to be unfounded. During our field exercises in November 2005, we realized that as a result of two measures taken by the Uttaranchal Forest Department since November 2004, the tiger may stage a come-back in the western portion of the Park. One measure, thanks to the thoughtful and bold initiative of G.S. Pande, present director of the Park, was the stopping of the collection of *bhabar* grass (*Eulaliopsis binata*) by the

local people for rope making and sale. When people came to the Park to collect the grass, which they did in the winter, from November to March, they wandered all over the hilly tract where the grass grows on steep slopes and where the tigers retreat to the deep *nallahs* and often cache their kills. In the process of their wandering, the people, who are extremely poor, often stole the kills of tigers and leopards aided by the large-billed crows (*Corvus macrorhynchos*) which locate the kills in the forests to scavenge on the remains. We believe that stealing of kills all through the winter, was serious a limiting factor to the tigers to breed successfully. This also possibly contributed to the gradual decline of sambar abundance as the kills stolen were largely of sambar. Between 1990 and 2000, in the forests around Dholkhand forest bungalow, an area of about 10 km², Mohamed Yasin, one of our reliable and able field assistants, has recorded stealing of 40 sambar kills.

The other measure taken by the Uttaranchal Forest Department was the resettling of *gujjars* from Haridwar and Motichur ranges, thereby reducing the disturbance levels significantly. Recent recovery of tigers in the Chilla range (150 km²) of the Park, on the east bank of the Ganga, soon after the resettlement of *gujjars*, is a conservation success story now (Harihar 2005, Johnsingh 2005). During our November 2005 exercise, we saw tiger pugmarks in all the four river beds (Harnol, Chidak, Rawali and Ranipur) in Haridwar range, where we had never seen pug marks in the past. It appears that the effective ban on *bhabar* grass collection (which should continue forever as it would enable tigers to

feed on their kills to the maximum) would help tigers to breed and increase in number. This may also help the recovery of sambar population. The ongoing resettlement of *gujjars* from the other five ranges in the western part of the Park would certainly facilitate tigers to have access to a larger part of the Park, thereby making their future much more secure on the west bank of the Ganga. Our ultimate objective should be to enable tigers range from the forests west of Yamuna river to Sharda river near Nepal border (an area of nearly 7,500 km²), which they did half a century ago. This would require banning of boulder mining across Yamuna and Gola rivers and the establishment of the long awaited Chilla-Motichur corridor. Going by the positive trend so far, it is likely that this objective would become a reality soon.

Acknowledgements

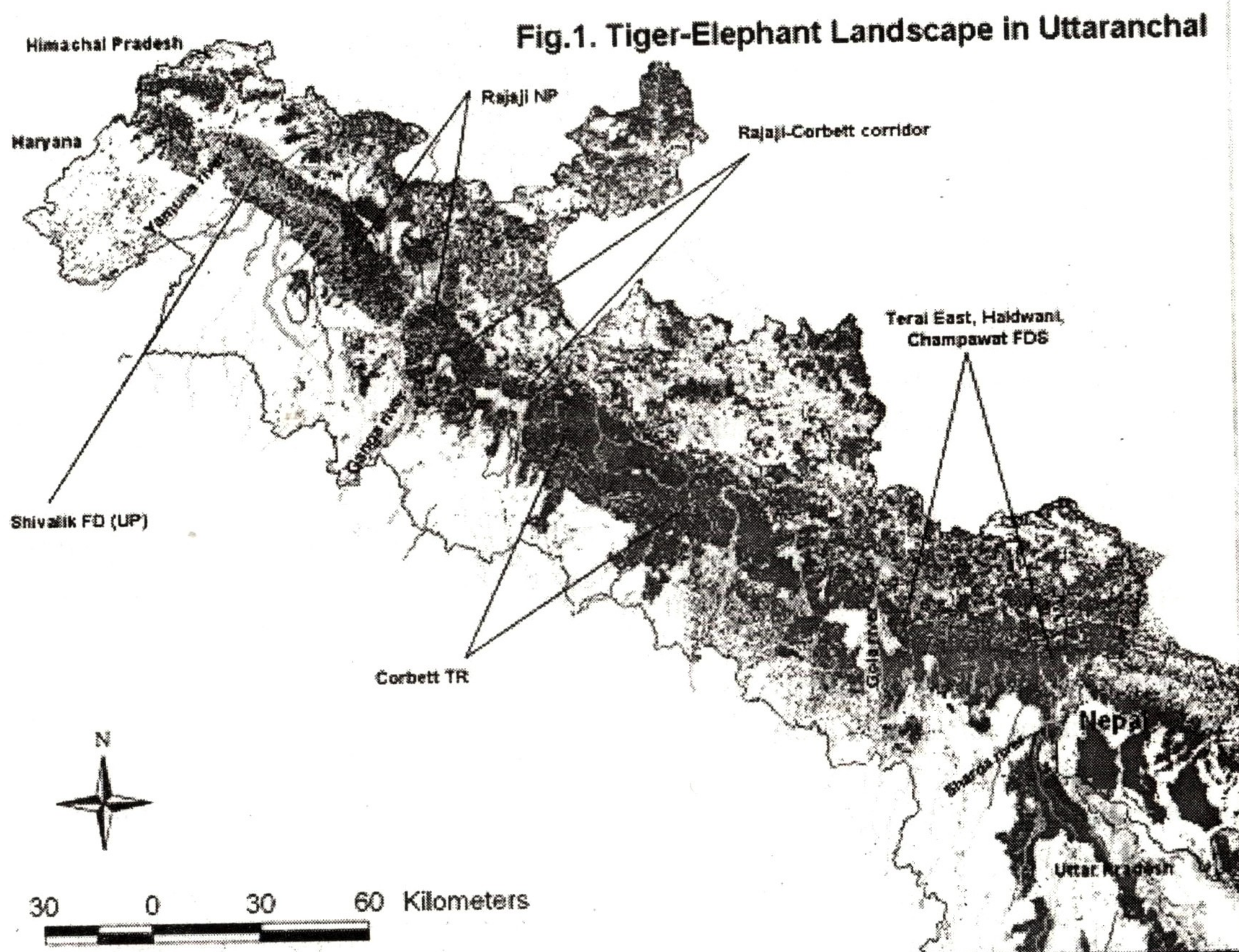
I am grateful to Uttar Pradesh and Uttarakhand Forest Department for having permitted me to visit and walk in the forest areas of Uttarakhand as and when needed. Shri A.S. Negi, Mr. Dhananjai Mohan, Dr. S.P. Goyal, Dr. G.S. Rawat, Mr. Qamar Qureshi, Dr. Bivash Pandav, Dr. Christy Williams, Dr. Justus Joshua, Dr. S. Sathya Kumar, Dr. B. S. Adhikari, Dr. K. Ramesh, Dr. Ashish David and K. Rajapandian are thanked for their excellent company in the field, Mr. M.P. Aggarwal and P. K. Tomar for word processing, Shirish Kumar Kyatham for preparing the figure and Dr. Nima Manjrekar for meticulously reading through the article.

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INFRASONIC ALARM FOR EARTHQUAKE

Raza H. Tehsin*

The observations by naturalists of some fauna shows that some of the sub-terranean animals come out of their burrows just prior to an earthquake. Also, some terrestrial animals show uneasiness and strange behaviour during this period.

Recent earthquake of Indonasia which triggered tsunami and destroyed vast area of inland once again brought urgency in efforts to find ways of an early warning system for earthquakes which subsequently cause huge tides. The behaviour of animals during tsunami indicates towards a possible explanation to their warning system. The devastating effect of tsunami killed several thousand people but there was no report of any casualty of wild animals. The only exception on the eastern coast of India was of an ailing boar.

One of the most publicised reports from Sri Lanka was about the tourists who were watching elephants in a National Park there. Without any provocation from the tourists or any untoward happening, the group of elephants raised their tails and fled away. The tourists followed the fleeing elephants too. Later, tsunami engulfed the area where the elephants were.

It has been proved that elephants communicate with their different groups by producing infrasonic sounds, which man lacks.

From these observations we can safely infer that when the pressure between the faults beneath the crust of earth reaches breaking point, it produces some infrasonic sound which is interpreted by the animals. The burrowing animals come out for safety. Some terrestrial animals also detect this infrasonic sound and start behaving erratically.

The behaviour of elephants in Sri Lanka

National Park is substantial indication. When the energy from the quake in Indonesia was moving beneath the sea surface, it might be producing infrasonic sound. As the speed of the sound was greater than the energy, the elephants caught it and sensing danger they fled to safer area.

Evidence that might have supported this inference was lost as no autopsy was done on the ailing boar, the only wildlife casualty on the eastern coast of India. It would have revealed that the ailing animal might be having impaired hearing.

An observation by the villagers of k. Panjinduppam in Nagapattinam district of Tamilnadu about the stray dogs and recorded by a volunteer also supports the inference. Panjinkuppam is around 1.5km from Pudupettai and Pudukuppam, the villages near the shore. According to the villagers of Panjinduppam, on the fateful morning, dogs from the two villages near shore started barking and withdrawing from the shore. As they reached near Panjinduppam, the dogs of this village too joined them. They were not barking on each other but were looking towards the sea and barking. The villagers were unable to decode this. More than one hundred fifty casualties were recorded in the two villages.

We need to hear the infrasonic frequencies which the animals are capable of decoding. Sensitive equipments that can detect all infrasonic sounds should be placed deep into the crust of the earth. Recording, analysing and corroborating infrasonic sound waves may lead to development of some early warning system for earthquakes.

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Monitoring of tiger, co-predators, Prey & Habitat

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For the first time in the country a massive exercise was conducted in all the 17 tiger range. States involving over 25000 Forest Beats (Lowest administrative unit in the Forest Department). The exercise was conducted not only in the Tiger Reserves but also in all the Forest Divisions where tiger presence had been reported in the past. The exercise was part of the 3 phase task to assess tiger densities & presence & absense of tigers. The first Phase of the exercise involved massive field work for which a scientific protocol was developed by the Project Tiger Directorate of the Ministry of Environment & Forest, Government of India with technical inputs from Wild life Institute of India, Dehradun. The protocol was evolved in the pilot study of Satpura Maikal landscape of Madhya Pradesh covering 48000 Km². A series of workshops were held before undertaking the pilot project. After the protocol was evolved & tested in the field, intensive training was given to officers I/c of various project tiger areas & other senior level officers who were then made responsible for training of field level staff down to Forest guard/ Wildlife guard level. Intensive training was given by these trained officers to field level staff in each state & a dress rehearsal was conducted to make the methodology fool proof. It was a matter of great satisfaction that the field level staff with their extensive field experience could pick up the protocol & applied the same during first

phase effectively with reasonable accuracy. For monitoring of tiger copredators, prey & habitat, phase wise actions to be undertaken are as under.

Phase I - Monitoring Tigers, Co-Predators, Prey & their Habitat

1. Divide tiger occupied forests into sampling units/beats (15-20 sq.km.)
2. Conduct sign surveys (3 days) for estimating relative abundance of carnivores
3. Conduct line transect sampling (2+3=5 days) for estimating relative abundance of ungulates
4. Determine human disturbance, habitat characteristics and ungulate pellet counts on transects at every 400 m
5. Compile data (division wise data entry)
6. Analyze for getting relative abundance and distribution maps of carnivores, ungulates, forest type, disturbance level at the beat resolution

Phase II Monitoring Tigers, Co-Predators, Prey & their Habitat

1. Prepare base maps of administrative boundaries, forest cover statistics and human disturbance
2. Combine the data from Stage - II to get maps of tiger distribution, relative abundance of tiger and other carnivores as well as ungulates
3. Model in the GIS domain to understand the distribution pattern of tiger and the

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underlying processes

Phaser III Monitoring Tigers, Co-Predators, Prey & their Habitat

1. Stratify the landscape based on the relative tiger abundance into four categories:

High

Medium

Low

Nil

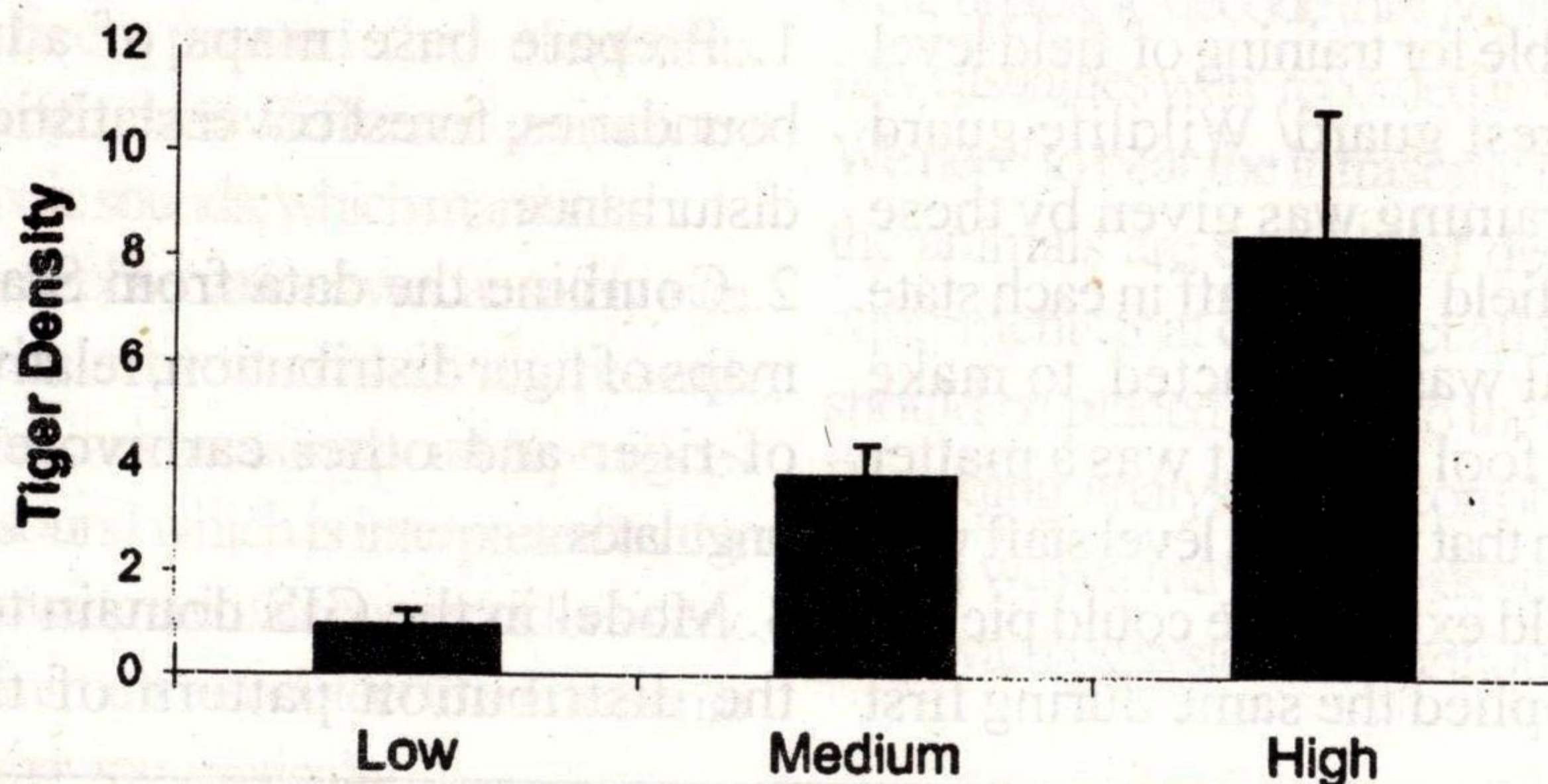
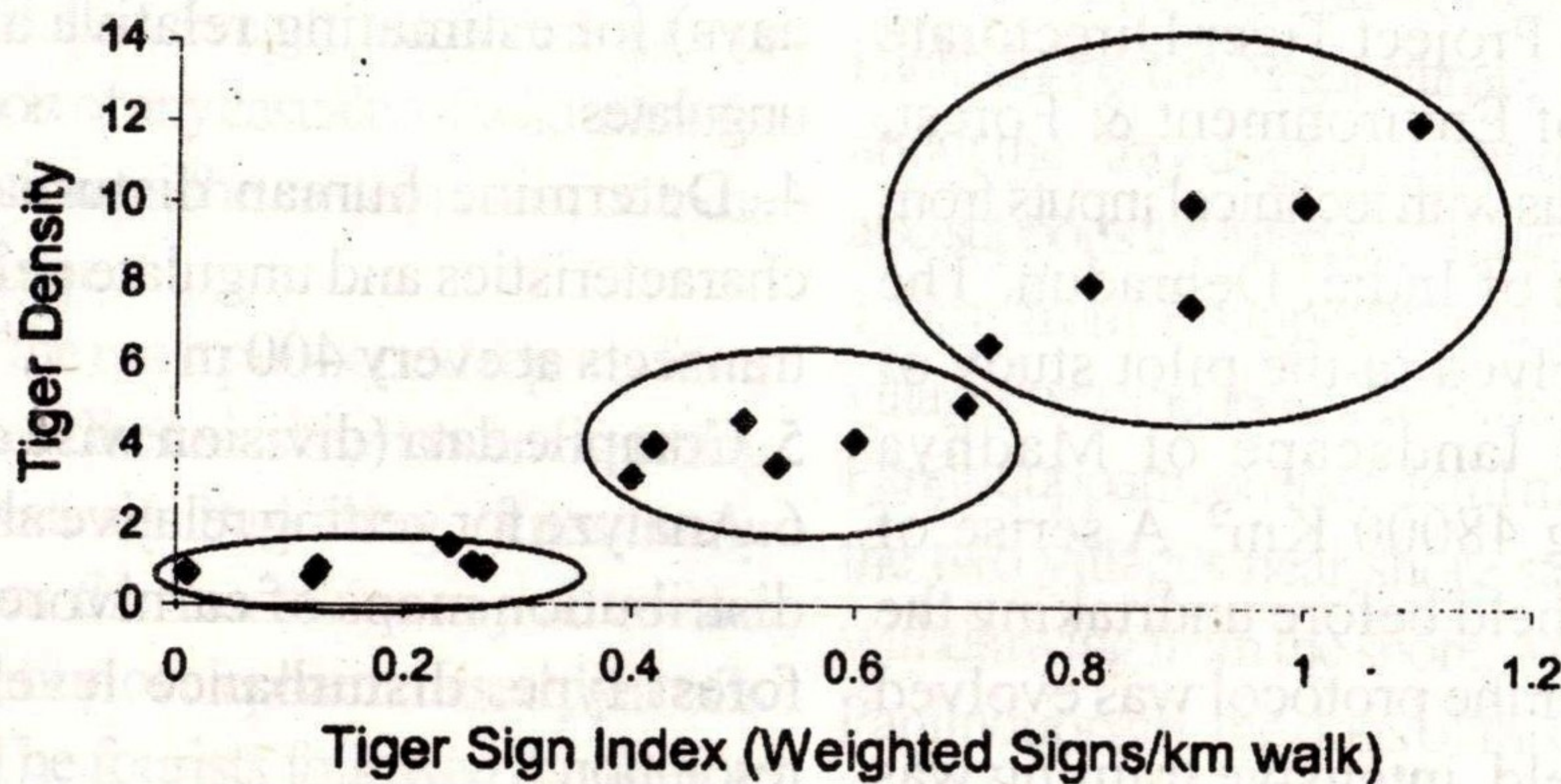
2. Within each strata in each landscape complex sample 3 to 5 replicates for estimating absolute densities of tiger and ungulates

3. Estimate tiger densities using any of the following (or combination of) methods in a 'mark-capture' statistical frame work :

- camera trap
- digital pug marks
- faecal DNA
- Sign deposition decay

4. Convert ungulate encounter rates into absolute densities by estimating habitat specific effective strip widths

5. Derive relationship between sign density and actual density for each landscape, and use the same for estimating tiger population giving 95% confidence range.



6. Manage data in a dynamic manner for field application, update and decision making at various levels.

ALL INDIA TIGER CENSUS-2005 (WINTER)

DHOLKHAND RANGE (RAJAJI NATIONAL PARK)

UTTARANCHAL

***Dipanjan Naha**

We are always pondering at the thought that how many tigers really do exist in the national parks and sanctuaries of India. Indeed one of the most disappointing events after the launch of Project Tiger in 1972 by the late prime minister Mrs. Indira Gandhi was the sudden disappearance of tigers from the much renowned Sariska tiger reserve of Rajasthan. This took the entire country by surprise.

All environmental institutions, wildlife activists, NGOs, researchers, scientists and nature lovers were literally at war over the number of tigers left in India. At this juncture PM. Manmohan Singh formed a five member tiger task force comprising of prominent environmentalists such as Sunita Narain, Valmik Thapar, H.S. Panwar etc., for recommending necessary action. The Tiger Task Force in one of their recommendations suggested carrying out of an all India tiger census with the combined efforts of Wildlife Institute of India, MOEF, Project Tiger and State Forest Departments.

Tiger census over the years has seen the application of plaster of paris on tiger pads and getting impressions by the forest guards. This method of working was felt laborious and controversial and thus Wildlife Institute of India proposed for a three phased census methodology. The 1st phase has to be conducted for monitoring tigers copredators prey & their habitat in the field by using

scientific methodology. The 2nd phase consisted of analysing the field data and preparing maps of tiger distribution, relative abundance of tiger and other carnivores as well as ungulates. The third phase envisaged estimating tiger densities using either camera traps or digital pugmarks or faecal DNA or sign deposition decay or combination of any of these. A team of 50 scientists from Wildlife Institute of India were to conduct and guide census work all over India from the month of Nov. along with the help and support of respective State Forest Departments.

The work of guiding and giving basic expertise on the new census methodology in Uttaranchal was conducted by Mr. Bivash Pandav and Dr. S.P. Goyal (WII)

I took part in the 1st phase of census in DHOLKHAND RANGE (RAJAJI NATIONAL PARK) along with my batch mate Omprakash. The scheduled date was from 8th to 15 Dec.05. The first phase of census was titled as 'Monitoring of Tigers, co-predators, prey and their habitat'. Our team included a Forest Guard, the Beat Officer and a WWF associate.

On the first three days of the census, each day we traveled around 5-6 km on three *Raos* (Dry river beds) namely Dholkhand, Gullerya, and Sapowali of Dholkhand beat. The work started with noting down of GPS location of the place.

The entire Rao upto 5-6 kms was intensively searched for pug marks by our team.

Besides pugmarks, vocalization, actual sighting, scats, marks on trees were also noted down. Signs, pugmarks of leopards, jackals & other copredators were also noted down for confirming their presence in the range. The fourth day was reserved for completing the paper work of the data obtained. From the signs that were noted we could say that there was evidence of presence of 3 male tigers and 3 female tigers in the range. The 5th, 6th, 7th day work comprised of walking on transects of 2-3 km length every day in respective beats for noting presence of ungulates and other herbivore species.

Besides the fauna a detailed study was done of the vegetation type, terrain type of the area. Walking on the transects involved a two phased work (1) noting down of encounter rates of ungulates and other herbivore species (2) counting pellets, dung, droppings of the herbivore species at every 400 mts in 20 mts X 2mt strips alternately marked on either side of the transect upto (2-3) km. During the

transect walk encounter rates of endangered species such as goral (*Nemorhaedus goral*), marten (*Marted flavigula*) and barking deer (*muntjak*) were noted down. Abundant presence of cheetal, sambar, elephant, langur were observed in the Range. Noting of presence of the endangered vultures in the Range were also conducted as part of the excersice. The Range Officer Mr. Mohan Bahukhandi & Deputy Ranger Mr. Badoni actively monitored the entire proceedings. The final day of Dec. 15th was again reserved for the paper work. In between the census there were visits by Dr. G.S. Rawat, Dr. A.J.T. Jonnsingh and Dr. S.P. Goyal. (Senior WII faculty). During the census it was observed that the Van-Gujjars were steadily evacuating the Range.

The 1st phase of census was thus over which will be followed by digital photography and cameratrapping by the expert team from Wildlife Institute of India. Thus a coorrect, scientific and more accurate information on the actual numbers of tigers, co-predators, their prey base and habitat in the country is eagerly awaited.

पर्यावरण में मेंढक का अनुठा स्थान

डा० भास्कर यादव

डा० अनिल एस. महाबल

पर्यावरण में मेंढक एक महत्वपूर्ण प्राणी जाति और विस्तार

संसार में मेंढकों की 4800 जातियाँ पायी जाती हैं। इसमें से अधिक से अधिक जातियाँ उष्ण कटबंधीय प्रदेश में निवास करती हैं। पौरात्य खंड के कुछ देशों में पाए जाने वाले मेंढकों की जातियों की तुलना में भारत में सब से अधिक जातियाँ पायी जाती हैं। (उदा० भारत: 194. बोर्नियो: 122. थायलैंड: 86 और युनान: 60)। आस्ट्रेलिया में मेंढक नहीं पाये जाते। भारत में 112 जातियाँ पश्चिमी घाट और द्वीपकल्पीय भारत (उष्ण कटबंध) में पाई जाती हैं। भारत में प्रदेश निष्ठ जातियों का प्रमाण 62 प्रतिशत है। यह प्रमाण स्थानों के हिसाब से असन्तुलन दर्शाता है। उदा० ईशान्य हिमालय में 35% तथा पश्चिमी घाट में 69%।

विशेषताएँ और शरीर रचना

मेंढक असमतापी प्राणी है। बाहर के तापमान का असर इन के शरीर पर तुरंत होता है। इसलिए मेंढक धूप काल में पानी में तथा पत्थर के नीचे रहते हैं और कई बिलकारी मेंढक जमीन के अन्दर छुप कर रहते हैं। सामान्यतः मेंढक 20° से 30° से.0 तापमान में रहना पसंद करते हैं। इसलिए मेंढक रात में या प्रातः काल के ढंडे तापमान में भक्ष्य पकड़ने बाहर निकलते हैं। इनके मुंह में गीली जिह्वा होती है जो उलटी लगी रहती है। आसपास धूमने वाले कीटों का अंदाज लेकर यह तेजी से जिह्वा बाहर निकालता है। जिस पर कीट चिपक जाता है। उसे मेंढक

तुरंत मुंह में लेता है। मेंढक का शरीर त्रिकोणाकृति होता है। इसकी आँखें बड़ी होती हैं। इनको बाह्यकर्ण और गर्दन नहीं होती है। इसलिए यह अपना सिर घुमा नहीं सकता। मेंढक के पिछले पैर मजबूत होते हैं। जिसकी सहायता से छल्ला लगाता है किन्तु तेजी से दौड़ नहीं सकता।

रंग विविधता

शत्रु या मानवी उपद्रवों से बचने के लिए मेंढक बिखरे हुए दाग और विविध रंगी लिबास धारण करते हैं। शरीर पर पीले, हरे, काले, भूरे रंग के छोटे बड़े पट्टे या दाग धारक मेंढक नदी, तालाब में या उसके आसपास दिखाई देते हैं। पेड़ पर रहने वाले मेंढक पत्तों में छुपने के लिए हरे या भूरे रंग के होते हैं। बिलकारी मेंढक मिट्टी जैसे मटमैले होते हैं। पश्चिमी घाट में पाये जाने वाले कवक मेंढक पीले या लाल रंग के होते हैं जिस से मेंढक पेड़ों पर छुपकर खुद को बचाता है। रंग संगती के अलावा यह कवक मेंढक उग्र दर्प भी छोड़ता है। भेक मेंढक भी सफेद रंग का जहरीला द्रव छोड़ता है।

आहार

सामान्यतः मेंढक एक सर्व भक्षी है किन्तु यह प्राणी खेती और दल-दल में रहने वाले और हानि पहुंचाने वाले कीटों को खा कर जैव नियंत्रक का कार्य करता है। इसलिए मेंढक का 'आहार शृंखला' में महत्वपूर्ण स्थान है। यह किसानों का मित्र कहलाता है। इसके साथ खाद्य में छोटे-छोटे कीट, जमीन पर रहने वाले मदुकाय प्राणी जैसे कि केंचवे, धोंगा, झिंगुर, हवा में उड़ने वाली

टिड्डियाँ, चीटियाँ आदि का समावेश होता है। बड़े आकार के राना जाति के मेंढक जिसे 'व्याघ्र मेंढक' कहते हैं और भैंस मेंढक, छोटी-छोटी मछलियाँ, चूहे, छछुंदर छोटे पछीं, केकड़े या मगरमछ के बच्चे तथा साँप को भी खा जाते हैं।

प्रजनन तथा वृद्धि

वर्षा ऋतु के आगमन के साथ-साथ रात में मेंढक विशिष्ट आवाज करते हैं। इस आवाज को प्रजनन मान कहा जाता है। मेंढकों को आवाज निकालने के लिए गले के पास नीले रंग की थैलियाँ होती हैं, जो प्रजनन काल में विकसित होती हैं। मेंढकों की जातियाँ उनकी विशिष्ट आवाज से भी पहचानी जाती हैं। मेंढक रात भर आवाज निकाल कर संगीत मय अनुरंजन करते हैं।

जब नर मेंढक की आवाज से आकर्षित होकर मादा उनके आस-पास आती है तब बड़ा नर मेंढक उसे पकड़ता है। यह वसाहत वादी प्राणी है। इसलिए अन्य मेंढकों को प्रजनन क्षेत्र में आने नहीं देता। यह अन्य मेंढकों को पिछले पैरों से दूर भगाता है। मादा को पकड़ने के बाद उनका मिलन होता है। उसके बाद मेंढकों की जोड़ी पानी में कूदती है। मेंढकों के अंडे पानी में सुरक्षित जगह फेंके जाते हैं। एक समय में विभिन्न जातियों की मादायें एक मी.मी. व्यास के दो सौ से दो हजार तक सफेद रंग के अंडों का पुंज पानी में छोड़ती है। पलित अंडों का विकास और वृद्धि होने के बाद उनमें से छोटी मेंढक मछलियाँ निकलती हैं। जो पानी में तैर कर सूक्ष्म कीटों को खा कर बड़ी होती है। उनको श्वसन के लिए मछली जैसे क्लोम और तैरने के लिए पूँछ होती है। दो महीने के अन्तराल में पूँछ लुप्त होकर क्लोम के शरीर के अंदर फेफड़ों का विकास होता है और मेंढक-मछलियाँ भू-जल

व्यापी प्रौढ मेंढक में रुपांतरित होती हैं।

विविधता

संसार में विविध आकार के मेंढक पाए जाते हैं। क्यूबा में इमली के बीज जैसे छोटे आकार के मेंढक मिलते हैं। भारत वर्ष में सब से छोटा मेंढक 'अरुंद मुखी' मेंढक कहलाता है। अफ्रिका में नारियल से बड़े आकार के मेंढक पाए जाते हैं। मेंढक की पीठ एक अपयुक्त रसायनों का भंडार है। कई रसायन जहरीले भी होते हैं। 'लीटोरिया सिस्लीया' नामक मेंढक के पीठ से उपयुक्त प्रतिजैविक (उदा० सीरीन, सीरीडीन) मिलते हैं। कई मेंढकों की चमड़ी में रक्तदाब, हृदयरोग, श्वसन संस्था, अभिसरण आदि ज्वरों के लिये उपयोगी तथा कृमि नाशक रासायन पाए जाते हैं। भारत में 'मेलेनोबट्राकस इंडिक्स' नामक मेंढक की जाति विलुप्त प्राय होती जा रही है।

मेंढक की मुलायम चमड़ी संवेदनशील होती है। फेफड़ों के अलावा चमड़ी द्वारा भी मेंढक सूखे काल में श्वसन करता है। परिसंस्था में कीट नाशक, रासायनिक खाद का प्रयोग तथा रासायनिक उदयोगों द्वारा विनाशक रासायन पानी में जमा होते हैं। प्रदूषित पानी में प्राणवायु की मात्रा कम होती है। यह पानी चमड़ी द्वारा लेने से मेंढकों को हानि पहुंचाती है। इसलिए मेंढक ज्यादातर साफ पानी में रहते हैं और कीटों को खा कर पानी को साफ भी रखते हैं। अतः जहाँ मेंढकों की संख्या कम है, वहाँ का जल प्रदूषित समझा जाता है।

अस्तित्व में खतरे

(1) नदियाँ, तालाब में मैला पानी छोड़ना, नदी पर कपड़े, बर्तन और गाड़ियाँ धोने से होने वाला प्रदूषण, रासायनिक घटकों का फैलाव, कृषि, सिंचन तथा निर्माण कार्य के लिए पानी का इस्तेमाल करना तथा शहरों की बढ़ती हुई आबादी,

इमारतों की संख्या आदि, मानव निर्मित कारणों से मेंढकों के आवास और अस्तित्व को ज्यादा खतरा हो रहा है।

(2) अन्य मानव निर्मित खतरों में मेंढकों के पैरों का विदेशों में निर्यात भी शामिल है। परिणामतः अनगिनत जीवों की हत्या के साथ यहाँ धान की खेती को भी बहुत नुकसान हुआ क्योंकि जिन उपद्रवी कीटों को मेंढक खाते थे। उनकी संख्या में अतंतुलित वृद्धि हो गई है। फिर भी गैर कानूनी ढंग से यह निर्यात चल ही रहा है।

(3) महाधियालयों में प्रयोगशाला में विच्छेदन के लिए अनगिनत मेंढकों का नियमित रूप से इस्तेमाल होता है। इस वजह से उनकी संख्या में निरंतर कमी हो रही है किन्तु यह भी देखा गया है कि, कई राज्यों में इस पर प्रतिबन्ध लगाए गये हैं, जो एक स्वागतयोग्य कदम है। अन्यराज्यों में भी इस प्रकार की कार्रवाही की आपेक्षा की जाती है।

संरक्षण तथा संवर्धन

मेंढक सृष्टी में जैव नियंत्रक का कार्य करते हैं। आहार श्रृंखला में इसका स्थान निर्विवाद है क्योंकि किसी विशिष्ट प्राणि जाति का नष्ट होना अन्य प्राणि जातियों के निर्वाह पर प्रभाव डालता है। इसलिए मेंढकों के संरक्षण तथा संवर्धन के लिए निम्नलिखित उपाय सुझाए जाते हैं।

(1) मेंढकों के संग्रह पर कठोर नियंत्रण रखना तथा प्रजनन काल में मादा मेंढकों तथा उनके बच्चों की सुरक्षा के उपाय करके उनकी पैदाईश, प्रजनन और वंश वृद्धि को बढ़ावा देना।

(2) रासायनिक प्रदूषण तथा मानव निर्मित खतरों पर नियंत्रण रखना तथा मेंढक पारिस्थितिकी यंत्र तथा खाद्य श्रृंखला के एक महत्वपूर्ण प्राणि संपदा है, जिस कारण इनका रक्षण करना तथा इसके प्रति जन जागरण की आवश्यकता है।

आभार

लेखक गण निदेशक, भारतीय प्राणी सर्वेक्षण कलकत्ता और नरेश कुमार के आभारी हैं।

From the Archives of "Cheetal"

The articles printed in "Cheetal" in the past, which have relevance today are being re-printed in this feature to stress their importance even after a long gap of time. It is hoped that this will be of interest to our readers, who are requested to bring such old articles to our notice which are of current relevance

The Tiger in Uttar Pradesh

V.B. Singh, I.F.S.*

Wildlife in general, and the tiger in particular, has suffered a great deal during the last two decades. There is concern about the future of wildlife in the country in the minds of naturalists and preservationists. But the number of genuine well-wishers of wildlife, contrary to a great deal of platitudinous lip service from others, can be counted on finger tips. There is, however, growing appreciation now about the role of wildlife in the cultural and economic life of the country. Ways and means are now being found to tide over the crisis. A large number of species have been declared as protected and their shooting has been banned completely all over the country. So far tiger was not included in the list of protected animals but the sudden realisation that their number had gone down considerably and the stage had come when its shooting should be banned completely, forced a large number of States in the country to close tiger shooting altogether. The one solution that occurs to every mind to protect and multiply the tiger population in the country is to exclude it from the bag list of the shooting permit. Suggestions and proposals come from various sources to adopt this well known solution to those interested in tackling this problem successfully.

Uttar Pradesh is one of the very few

States which still allows tiger shooting. While taking such a decision we have considered the present status of tigers in the State in all its aspects.

The adaptability of tiger to various climatic conditions can easily be judged by the fact that it had a wide geographical distribution from the snowy regions in northern part of Asia to the tropical Indian climate. It once lived in Eastern Turkey and near the Caspian sea and its habitat extended to the Russian Manchuria. It was also found in the Northern Afghanistan and Iran and into the USSR, near Lake Balkhash. The species is not found in the Chinese Turkistan but a few animals still exist in North Korea. A different species of tiger is still found in the southern part of Yunnan which lies at the junction of China, Burma and Laos. The tiger is widely distributed in the far eastern region of Asia, especially in Malaya and is known to have penetrated the Indonesian chain of islands. The tiger territory in India extends from Assam westwards through Bhutan and Nepal to Himachal Pradesh and from Uttar Pradesh and Rajasthan southwards over the whole peninsula. The species was also found in the Indus valley of West Pakistan but the last animal is reported to have been shot in the last century.

*Ex Chief Wild Life Warden, U.P.

It is apparent that tiger is not inhabited in its habitat by climate or topography. All that it requires is good vegetation cover, perennial supply of water and sufficient food

THE TIGER IN UTTAR PRADESH

India tiger is found in all anjor types of forests, including the thorny, dry and moist deciduous, semi evergreen and evergreen. Uttar Pradesh which lies between 77.5° and 85° E longitude and 23° and 31.3° N Latitude has an area of 2,94,364 sq km. Under the wide range of climatic conditions of the State, a large number of floristic zones have developed. An area of

45,711.43 sq. miles which is approximately 15.5% of the total geographical area of the State is covered by various forest types. The Sub-Himalayan zone and the Tarai tract along the foothills, extending from Siwalik areas to Gorakhpur constitute the main habitat of this animal. The other main tract where tigers are found are the dry scrub and thorny forests of the Vindhyan Region in the south extending from Varansi forests to Bundelkhand area. The tiger habitat in Uttar Pradesh covers roughly an area of 11,125 sq km. which is distributed as follows among the various forest divisions.

Divisions	Sq. km Tiger area	No. of tiger	
Siwalik	670	13	
East Dehra Dun	470	12	
West Dehra Dun	260	7	
Total	1,400	32	44 sq km per tiger
Landsdowne	650	36	
Kalagarh	523	24	
Corbett Park	502	45	
Bijnor	376	15	
Ramnagar	865	40	
Tarai & Bhabar	920	16	
Haldwani	600	20	
Total	4,436	196	22.5 sq km per tiger
Rohikhand	40	3	
Pilibhit	860	52	
South Kheri	520	39	
North Kheri	985	50	
Baharaich	340	16	
North Gonda	452	37	
Gorakhpur	117	9	
Total	3,314	206	16.5 sq km per tiger
Varansi	500	10	
North Mirzapur	150	4	
Dudhi	500	9	
Banda	605	18	
Bundelkhand	140	6	
Total	1,895	47	40.0 sq km per tiger
Grand Total	11,125	481	23 sq km per tiger

Toger Population

Only about a couple of centuries back the Sub-Himalayan and Tarai regions and most of the Gangetic plain were teeming with wild life. Tigers were also as numerous and their number ran into thousands-probably five thousand or more. The total tiger population of India, as estimated now in 1969 is nearly 4,000 while the number was estimated at forty (40) or fifty (50) thousand only half a century back. No proper census of tiger population has been conducted in the State. But during the year 1967-68 and 1968-69 efforts were made to obtain as accurate an estimate of the number as possible through enquiries and observations. Detailed questionnaire was given to each Wild Life Guard and Assistant Wild Life Warden whose jurisdictions were clearly defined. They were required to enquire from knowledge able sources like local shikaries, graziers and forest staff about the number of tigers and their movements in specific areas. The information as collected and supplemented by the observations of the wild life staff was compiled to give an approximate but conservative estimate. Division-wise details have been given above. The entire habitat of the tiger is divided into the following four zones which represent typical climate and topography. The number of tigers in each zone is estimated as follows :-

- | | |
|--|-----|
| 1. Siwalik Region (includes Siwalik, E. Dehra Dun and West Dehra Dun) | 32 |
| 2. Himalayan foot hills (Lansdowne, Kalagarh, Corbett Park, Bijnor, Ramnagar T and B and Haldwani Divisions) | 196 |
| 3. Tarai Region (Rohilkhand, Pilibhit, S. Kheri, N. Kheri, Bahraich, N. Gonda, Gorakhpur) | 206 |
| 4. Vindhyan Region (Varansi, North Mirzapur, | |

Dudhi, Banda and Bundelkhand).

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Total: 481

The above figure of 481 tigers in the State, if anything, is on the lower side as only such tigers about the existence of which there is no doubt, have been accounted for in the estimation. There is no doubt that at least 25% of population must have gone unaccounted and this figure may even be as much as 50% also. Even if we do not take this into consideration, it will be a fair guess to keep the tiger population at 500. The bulk of the tiger population is confined to the Himalayan foot hills and Tarai Regions with every 22.5 sq km and 16.5 sq km respectively having a tiger. Siwalik and Vindhyan Regions are now left with only a sprinkling with 44 sq km respectively having a tiger. While the ferests of Vindhyan Regions were never famous for tigers, the Shiwalik Region has suffered a great deal during the last few decades. That the total number of tigers in U.P. has come down to a few hundred from few thousand (around 4 to 5 thousand a century back) calls for immediate probe into the reasons which have lead to this catastrophic state.

Annual Production and Mortality

The average life span of tiger has been variously estimated at 18-20 years. The age of ecxual maturity of tigers ranges from 3-4 years. It can be safely estimated that of the total number of 500 tigers in the State, as many as 100 may be below 4 years age. The ratio of male and female encountered in young tigers has been 1:1. There is no reason to believe that this ratio does not exist when the young ones grow up. In fact the possibility of survival of femeles is always more than those in males. Under no circumstances, therefore, the number of

tigresses can be less than that of males. It is accordingly estimated that out of 400, there must be at least 200 tigresses in the State. If young of a tigress survive, each tigress has a litter at most every 2 to 2 ½ years. A free living tigress that loses her cubs in some mishap is potentially able to have new litter within about 5 months. A tigress gives birth to 2 to 5 cubs in a litter. If from each litter an average of two cubs reach maturity, the average number of young raised per adult tigress per year is one. Accordingly it is estimated that on an average 100 tigers should be added to the population per year. If the total number of tigers shot or killed otherwise does not exceed 100, theoretically there is no reason to assign shooting as the main cause of depletion of tiger population. Nearly 60 tigers are shot in the State on the average annually. The total number of mortality on account of natural death, poaching and other accidental reasons can not in any case be more than 10 to 15 per year. As against a total mortality of 75 tigers, we have an intake of nearly 100 tiger, which leaves us with an increase of nearly 25 tigers per year. A general feeling among the sportsmen who go out to the forests regularly is that in several areas there has been a definite increase in the

number of tigers in this State, though there has not been corresponding increase in the number of other game. There are however, some problem areas where the number has not increased even after closure of tiger shooting for over five years. Such areas are mainly in Dehra Dun forests and elsewhere, where on account of local adverse factors there has been no improvement in the situation. It will be seen that shooting through permits is not responsible for any dissipation of tiger population, if it is suitably regulated and restricted. In fact the causes of general depletion in tigers lie elsewhere.

8. Reasons for Decline

The one reason for the decline of tiger population which occurs to every mind is continued shooting of tigers allowed in the Reserved forests. It is believed that closing of tiger shooting for 5 or more years is absolutely indicated as a solution to this problem. Tiger shooting on permit has been allowed in our forests since the last many years. The rules regulating tiger shooting were not as stringent as they are today. An average of nearly 100 tigers were shot annually as the following figures will show from the period 1946-47 to 1954-55.

Number killed

Year	Tigers	Tigresses	Total
1946-47	72	44	116
1947-48	55	26	81
1948-49			
1949-50	56	26	82
1950-51	67	27	94
1951-52	65	29	94
1952-53	40	57	97
1953-54	67	39	106
1954-55	61	36	97

The number came down to 37 in 1963-64, but considering the odds against the tiger population, it was decided in 1964-65 to fix a ceiling of fifty tigers which could be allowed to be shot through permit annually. Accordingly with the help of figures available about the number of shooting permits issued and the number of tigers shot during the last ten years,

it was decided to close tiger shooting in 64 blocks and permit shooting only in 58 blocks. The procedure of issuing shooting permit at least two months in advance precluded the possibility of keeping the bag limit within 50 but the number of tigers shot from 1964-65 will indicate definite reduction in the number.

Number killed

Year	Tigers	Tigresses	Total
1964-65	32	12	44
1965-66	53	11	64
1966-67	38	11	49
1967-68	39	21	60

As mentioned earlier, the number of tigers allowed to be shot has been so regulated that the possibility of extermination of this species on account of shooting has been completely obviated. In the main tiger habitat as given above there are nearly 481 tigers in an area of 1,125 sq km which brings on the average one tiger per 23 sq km (or 9 Sq. miles). The average density of tiger in the State can be considered as fairly adequate.

We can not increase the number of tigers indefinitely in a limited area without jeopardising not only their own existence but the existence of other wildlife, domestic cattle and human beings. There is an optimum number of tigers that a habitat can sustain. We have only to see if the present habitat can support any more tigers. If it can not, the question of closing tiger shooting and increasing its number in that habitat does not arise. The general depletion in the total number of tigers has been mainly due to the reduction in suitable tiger habitat and deterioration in habitat quality.

In the recent years, vast tracts of land have been cleared for various industrial undertakings, irrigation and power projects. Vast stretches of forests have been felled under the so called 'Reclamation schemes' for expansion of agriculture to meet the mounting pressure of an ever increasing population and to settle refugees. An area covering 1200 sq. miles (3000 sq. km) which formed our best tiger habitat has been clearfelled after independence to meet these demands. The tiger has been the greatest sufferer as bulk of the colonization activities were confined mainly to Terai Tracts all along the Himalayan foot hills. How tigers and other wild life were destroyed in these colonization schemes is not unknown. In addition to this direct loss, the extension of cultivation right upto and inside the reserved forests has been responsible for manifold reasons leading to deterioration of habitat and destruction of wildlife. Vegetation has been ruined by men and cattle and wildlife has been shot and snared under the pretext of

crop protection.

Intensive forest exploitation and raising of plantations of industrial importance are the other two factors responsible for reduction of tiger habitat. There is hardly an area in the forest which is free from human activity. Marking of trees, regular fellings, silvicultural operations, dry markings and fellings, drift wood marking, petty demand sales, extraction of grasses, lopping and grazing by gujars and their buffaloes, etc., go on all over the forest. A shy animal like tiger can not live peacefully under such disturbed conditions. It is either on the move during the days also or seeks refuge in the adjoining sugar fields where interference is comparatively absent. In fact tigresses have been seen to breed and rear their cubs in these fields quite frequently. As if these activities were not enough, large scale plantations are taken up every year in these areas, which involve clear felling of several thousand acres at a stretch. Every year nearly 24,000 hectares are being clearfelled and planted. One can imagine how adversely the destruction of natural habitat must be affecting the tiger population of the state.

While large scale shooting and poaching in the past were also responsible for bringing down the tiger population to the present stage, effective shooting restrictions and vigilance have more or less completely cut down destruction of tiger population on this account. We can claim with confidence that not more than 10 tigers, if at all, are shot annually by poachers and others clandestinely. Poaching of tiger now ceases to be an important adverse factor in this State.

How tiger is protected in Uttar Pradesh

Regulated shooting of tigers in selected

shooting blocks is allowed in Uttar Pradesh after careful consideration of the conditions relating to its preservation and multiplication. The position is reviewed regularly and suitable steps are taken in time. In fact as mentioned earlier, necessary measures for the protection of tiger have been taken in stages since the last many years and these have been intensified during the last ten years.

In early thirties the 'Association for the Preservation of Game in U.P.' was formed under the patronship of Sir Malcolm Hailey, Governor of United Province with such noted naturalists as Jim Corbett and Hasan Abid Jafry as Hony. Secretaries. Much useful work was done by this Association and as a result of its efforts and recommendations the (Hailey) Corbett National Park, a tiger refuge in the real sense, was constituted in 1935. The area of this park was extended in 1966 from 125 sq. miles to 201 sq. miles to include the adjoining areas rich in tiger population. In addition there exist at present 6 other sanctuaries, which include ideal tiger habitats, spread over the State from Dehra Dun to Varanasi. These sanctuaries provide breeding areas and the Corbett National Park can be considered as the nursery for the tigers.

There is no doubt that the overflow of tigers on account of regular annual breeding in the park is naturally distributed in the adjoining forests of Kalagarh, Lansdowne and Ramnagar divisions. One has only to enquire from the adjoining villages to find out how the tiger population has increased in their forests. Out of a total of 122 shooting blocks 64 blocks were closed to tiger during 1968-69 shooting season. In the coming shooting season of

1969-70 eight (8) more blocks have been added to the closed list. Such blocks which were either overshot or which are considered to provide good breeding areas are included in this list. Some of the blocks can be and are reopened after 5 or more years and in their places equal number or more shooting blocks are closed. This periodical and rotational closure gives and provides them an opportunity to breed and multiply unmolested.

Tiger shooting is closed from 1st June to 15th October. From the coming shooting season 1969-70 the month of May has also been included in the closed period. Thus no tiger shooting is allowed in the State for nearly six months in a year. Male tigers 8¹ and female below 7¹ are treated as tiger cubs and no one is allowed to shoot them. Shooting of tigers is allowed during the day only between sun rise and sunset. Tigers are not included in the bag limit allowed under shooting permit unless the applicant possesses rifle of 375 magnum or 400 bore nonmagnum and above with at least 300 grains bullet weight and above. Carrying of slugs and buck shots is prohibited. Not more than one tiger is allowed on a permit and no one can have more than two blocks in a year. Tigers can not now be declared as cattle lifters arbitrarily.

If a tiger has killed at least five heads of cattle within one mile of the place where the first

animal was killed and that too within a period of six months, then only a tiger can be declared a cattle lifter. Other measures like imposing of enhanced royalty on tigresses, fixing the number of elephants a permit holder can use on beats and declaring animals shot in protection of self and property are on way. These measures though fairly adequate need regular strengthening. Their strict and rigid enforcement has saved our tiger population from dissipation..

Conclusion

Tiger is surviving in this State against various odds on account of its hardness, cunning and elusive habit as also on account of the protective measures taken in Uttar Pradesh. While there is no room for complacency, there is hardly any reason to be pessimistic about its future survival. Continued vigilance and proper management will not permit destruction of tiger at the hands of poachers or pseudo shikaris. The greater danger to tiger comes from another quarter, viz., growing civilization and intensive exploitation of forests. If we go on losing tiger habitats to cultivation, colonies, industrial projects and plantations, no one can save tigers in this State even if shooting by permit is completely closed. Future of tiger, therefore, lies only in the protection of its habitat.

Cheetal

Young Readers Section

A section for young readers has been introduced in Cheetal starting from this issue. It will contain articles in Hindi & English contributed by students. This will encourage our young readers to read and write about environmental & conservation issues of local, national & international concerns. Our readers are requested to encourage & guide our young generation to contribute articles on environmental/ conservation/ wildlife issues which will be promptly printed and a complimentary copy of the journal will be sent to the contributor. The section will also contain useful information about important mammals birds reptiles amphibians etc

A.S. Negi

हाथी

स्वाती नागर

ईश्वर ने पृथ्वी को कई प्रकार की भिन्नताओं से सुसज्जित किया है। इसमें कई प्रकार के सूक्ष्म जीव से लेकर अधिकाधिक आकार के जानवर हैं। यह सभी अनुशासित ढंग से रहते हैं। इस प्रकार यह प्रकृति अपनी आप में भिन्नता सन्जोए हुए है।

पृथ्वी पर सबसे बड़ा जानवर होने का गौरव हाथी को प्राप्त हुआ है, किन्तु वह अपनी आकृतिनुसार कठोर नहीं है। इस विशालकाय जानवर का वर्णन हमें पुराणों तथा तथा इतिहास में मिलता है। इसके अतिरिक्त इसका धार्मिक महत्व भी है। 17वीं शताब्दी में यह महान सम्राज्यों की सेना का हिस्सा होता था।

हाथी के प्रकार

सन्सार में हाथी की केवल तीन जातियाँ पायी जाती हैं—

- (1) अफ्रीकन सवाना (Loxodonta africana)
- (2) अफ्रीकन फोरेस्ट (Africana cyclotis)

(3) ऐशियन एलीफेन्ट (Elephas maximus)

वास स्थल तथा विस्तार

ऐशिया में ऐशियन हाथी, जंगलों व घास के मैदानों में पाए जाते हैं। तथा अफ्रीकन सवाना प्रजाति पूर्वी एवं दक्षिण अफ्रीका में तथा अफ्रीकन फोरेस्ट प्रजाति मध्य एवं पश्चिमी अफ्रीका के जंगलों में पाए जाते हैं।

हाथी समूची दुनिया में अफ्रीका के 37 देशों में तथा एशिया में 13 देशों में पाए जाते हैं। एशिया में अधिकतर यह श्री लंका, भारत, सुमात्रा आदि में पाए जाते हैं।

भारत में— असम, अरुणाचल प्रदेश, मेघालय, बिहार, तमिल नाडू, केरला, कर्नाटक, आंध्र प्रदेश, उत्तर प्रदेश, उत्तरांचल, उड़ीसा, झारखण्ड आदि में पाए जाते हैं।

आकार अथवा आकृतिकी (MORPHOLOGY)

1. हाथी की सूंड, उसकी नाक व ऊपरी होठ के

संगम (Union) से बनती है तथा यह 100,000 (एक लाख) मास्पेशियों (Muscles) से बनी होती है।

नोट :- हाथी अपनी सूंड से पानी नहीं पीता अपितु उसे पानी पीने के प्रयोग में लाता है उसी प्रकार जिस प्रकार हम अपने हाथों का प्रयोग कर पानी पीते हैं।

2. हाथी बहुत अनुकूलित (Adaptable) होते हैं।
3. इनकी त्वचा शरीर के कुछ भागों में 2.5 सेमी तक मोटी होती है।
4. इनका दिमाग का भार 4 से 6 किग्रा होता है।
5. इनका भार, आकार एवं रंग जाति पर निर्भर करता है।

एशियन हाथी की आकृतिकी

1. एशियन हाथी का गोलाकार (Dome shape) सिर व सिर के मुकाबले छोटे कान होते हैं।
2. इनकी पीठ मेहराव आकार (Arched) की होती है तथा सूंड के अग्रभाग में अगुली के आकार का उभराव (Protuberance) होता है।
3. इनके आगे के पॉव में 5 तथा पीछे के पॉव में 4 अगुलियाँ होती हैं।
4. नर हाथी का भार— 6 टन तक तथा कंधे पर ऊँचाई 10 फीट तक होती है।
5. लिंग भेद (Sexual dimorphism)
मादा हाथी का आकार नर हाथी से छोटा होता है। नर हाथी के दिखावटी बड़े दाँत (Tusk) होते हैं तथा मादा हाथी के छोटे दाँत (Tushes) होते हैं। किन्तु कभी-कभी मादा हाथी के दाँत औसत से अधिक आकार के भी हो सकते हैं।

अफ्रीकन हाथी की आकृतिकी

1. इनकी पीठ सीधी व विशाल आकार के कान सूंड के अग्रभाग में दो अगुली नुमा आकार के अलग तरह के उभराव होते हैं।
2. इनके दाँतो (Molars) में अलग तरह का

उभराव होता है जो एशियायी हाथी की तुलना में अधिक कठोर या रूक्ष होते हैं।

3. इनके आगे के पॉव में 4 तथा पीछे के पॉव में 3 अगुलियाँ (Toes) होती हैं।
4. इनके रीढ़ में (लुम्बर भाग में) एक अतिरिक्त हड्डी होती है।
5. नर और मादा दोनों में बाहरी दाँत (Tusk) लगभग एक जैसे होते हैं तथा इनका आकार एशियन हाथी की तुलना में अधिक बड़ा होता है।
6. अफ्रीकन नर हाथी 9 टन तक वजनी व 12 फीट तक ऊँचा होता है।
7. अफ्रीकन सवाना हाथी 195 कि.मी. प्रतिदिन तक दौड़ते हुए चल सकते हैं।
8. हाथी अपने भार का 4-7 प्रतिशत भोजन खा सकते हैं। इन्हें खाने में घास, छोटे पौधे फल छाल (Bark) तथा पेड़ों के पत्ते व पतली शाखाएँ खाना पसन्द करते हैं।

सामाजिक स्वभाव

(SOCIAL BEHAVIOUR)

1. परिवार एवं ममता (PARENTAL CARE)
मादा हाथी अपने बच्चों के साथ मिल एक ही परिवार (Core group) में रहती हैं। यह परिवार नारी प्रधान (Matriarchal) होते हैं। मादा हाथी अपने परिवार में ही रहते हैं जब कि नर हाथी युवा होने पर परिवार से निकाल दिए जाते हैं। सभी मादा हाथी मिल जुलकर प्रेमभाव से रहते हैं।

जब अफ्रीकन नर हाथी अपने परिवार को छोड़ता है, तो वह अन्य नर हाथी के परिवार में सम्मिलित हो जाता है। यह नर परिवार जल्द ही अलग हो जाता है। किन्तु इस परिवार के सभी सदस्य एक दूसरे को अच्छी तरह से जानते हैं तथा इनमें शारीरिक शक्ति, उम्र आदि के आधार पर वरीयता क्रम (Heirarchial Organisation) पाया जाता है।

2. संतानोप्ति (BREEDING)

हाथी 13-14 वर्ष की आयु में सहवास करने के योग्य हो जाता है।

उच्च श्रेणी (rank) के नर हाथी के जीवन में अत्यन्त उत्तेजना (Sexual activity) का समय (Period) आता है जिसे मस्थ (Musth) कहा जाता है। इस समय वह अपने नर परिवार को छोड़ कर सहवास के लिए उपयुक्त मादा जो माहवारी (Cestrus Period) में हो, का चुनाव करता है। एक नर परिवार में, एक समय में एक ही नर इस स्थिति (Musth) में होता है। इसी कारण उपयुक्त मादा के चुनाव की स्पर्धा में विभिन्न जगह के नर हाथी एकत्र होते हैं। किसी भी नर हाथी का इलाका (Home range) बहुत बड़ा होता है जिसमें मादा हाथी के परिवार भी आते हैं। जब भी कोई मादा हाथी माहवारी (Oestrous period) में होती है, तब उसी जगह का नर हाथी जो उच्च श्रेणी (rank) का हो, वही उस मादा के साथ सामान्यतः सहवास करता है।

नर हाथी की उत्तेजनात्मक स्थिति

प्रजनन काल में नर हाथी की कनपट्टी पर स्थित एक ग्रन्थि (Orbital gland) से मस्थ (Musth period) में एक गाढ़ा तरल पदार्थ निकलता है जो तीव्र गंध युक्त होता है। नर हाथी इस ग्रन्थि को विभिन्न पेड़ों पर रगड़कर अपनी उपस्थिति व अधिकारिता का प्रमाण देता है।

गर्भधारण काल

(GESTATION PERIOD)

एशियन हाथी का गर्भधारण काल (Gestation Period) 19 से 22 माह का होता है। यह माना जाता है कि नर शिशु के जन्म का समय (gestation period) मादा शिशु की तुलना में अधिक होता है।

मादा हाथी सामान्यतः 50 वर्ष की उम्र तक, बच्चों

को जन्म दे सकती हैं।

मादा हाथी एक समय में केवल एक बच्चे को ही जन्म देती है। कभी-कभी जुड़वा बच्चे भी हो सकते हैं।

दो बच्चों के जन्म में $2\frac{1}{2}$ से 4 साल तक का अन्तराल हो सकता है तथा एक मादा हाथी अपने जीवन काल में 12 बार तक गर्भ धारण कर सकती हैं।

प्रबोधन (COMMUNICATION)

सभी समाजिक जानवरों के समान हाथियों की अपनी भाषा होती है जिसमें वह एक दूसरे से वार्तालाप करते समय अपनी सूंड, देखने, सूंघने, स्पर्श व स्मरण शक्ति का भरपूर प्रयोग करते हैं। हाथी एक दूसरे से, अधिक दूर होने पर भी सम्पर्क कर सकते हैं।

वह 10 कि.मी. या अधिक की दूरी से भी सूक्ष्म ध्वनि तरंगों द्वारा सन्देश दे सकते हैं। अन्य (Body postures) शारीरिक संकेतों की सहायता से भी अपनी इच्छाओं, अपने भावों (खुशी, दुख, डर, क्रोध आदि) को व्यक्त कर सकते हैं।

हाथी एक दूसरे से सम्पर्क रसायनों (Chemicals) तथा अपने शरीर के विभिन्न अंगों को हिलाने से, कायम कर सकते हैं। यदि हम इनके सभी शारीरिक भागों को उनकी प्राथमिकतानुसार लगाएं तो इनमें सबसे ऊपर ध्वनि (Acoustics) तथा रसायन (Chemical) सम्बन्धी तंत्र होंगे। इनके बाद दृष्टि व स्पर्श तंत्र (Visual & Tactile system) आता है।

सभी जानवरों की अपेक्षा हाथियों में इतने प्रकार के संपर्क के लिए तंत्र क्यों हैं? यह सभी विधियाँ किस लिए उजागर हुईं?

कारण निम्न हैं :

1. हाथियों की संगणन प्रक्रिया (Social system) बहुत जटिल है जिसके कारण उनको सभी

प्रकार के सम्बन्धों को निभाना पड़ता है जिसके लिए उन्हें विभिन्न प्रकार के सम्पर्क स्थापित करने पड़ते हैं।

2. हाथी की उम्र बहुत लम्बी होती है। इसी कारण उसके स्वभाव का अधिकाधिक भाग सीखकर व अनुभव से प्राप्त होता है। इसी कारण उसे स्वविचार से अधिक दूसरे हाथियों से सम्पर्क बनाना पड़ता है।

3. हाथी का दिमाग शरीर की तुलना में बहुत बड़ा होता है। जिसके कारण उसकी स्मरण शक्ति बहुत अच्छी होती है तथा वे कई प्रकार की ध्वनियों का प्रयोग कर सम्पर्क स्थापित कर सकते हैं।

घ्राण शक्ति की भूमिका व महत्व—

हाथी के जीवन में घ्राण शक्ति (Scent) का अधिक महत्व है। यह, हाथी के आत्मविश्वास को बढ़ाती है। कूहमें (Kuhme) (1963) ने अफ्रीकन हाथी पर शोध करते हुए पता लगाया कि जब अफ्रीकन हाथी अपने प्रतिद्वन्दी का सामना करते हैं तो पहले वह अपनी सूंड को गोल घुमाकर अपनी मस्थ ग्रन्थि (Temporal gland) को सूंघता है। इस प्रक्रिया से उसका आत्मविश्वास बढ़ता है और वह अपने प्रतिद्वन्दी पर आक्रमण भी कर सकता है।

हाथी के बारे में कुछ दिलचस्प तथ्य—

1. हाथी रोते व हंसते भी हैं तथा उनकी स्मरण शक्ति बहुत तेज होती है।

2. हाथी बहुत सम्वेदनशील जानवर है। यदि कोई हाथी का बच्चा शिकायत करे तो सभी उसको स्पर्श से मनाते व प्यार करते हैं।

3. मृत हाथी के जन्म पर भी, परिवार के सभी सदस्य शोक व्यक्त करते हैं।

4. हाथियों में भी बिछुड़े हाथी के लौट आने पर जश्न मनाया जाता है।

5. एशियन हाथी, पुरातन काल के मैमथ (Mammoth) से ज्यादा सम्बन्धित है।

उम्र— हाथी की औसत उम्र 60—70 वर्ष तक होती है।

हाथी का पर्यावरण पर प्रभाव

1. हाथी पारिस्थितिकी तंत्र (ecosystem) में महत्वपूर्ण भूमिका निभाता है।

2. वह अपने वास स्थल (Habitat) को जंगल से घास के मैदान में बदल सकता है।

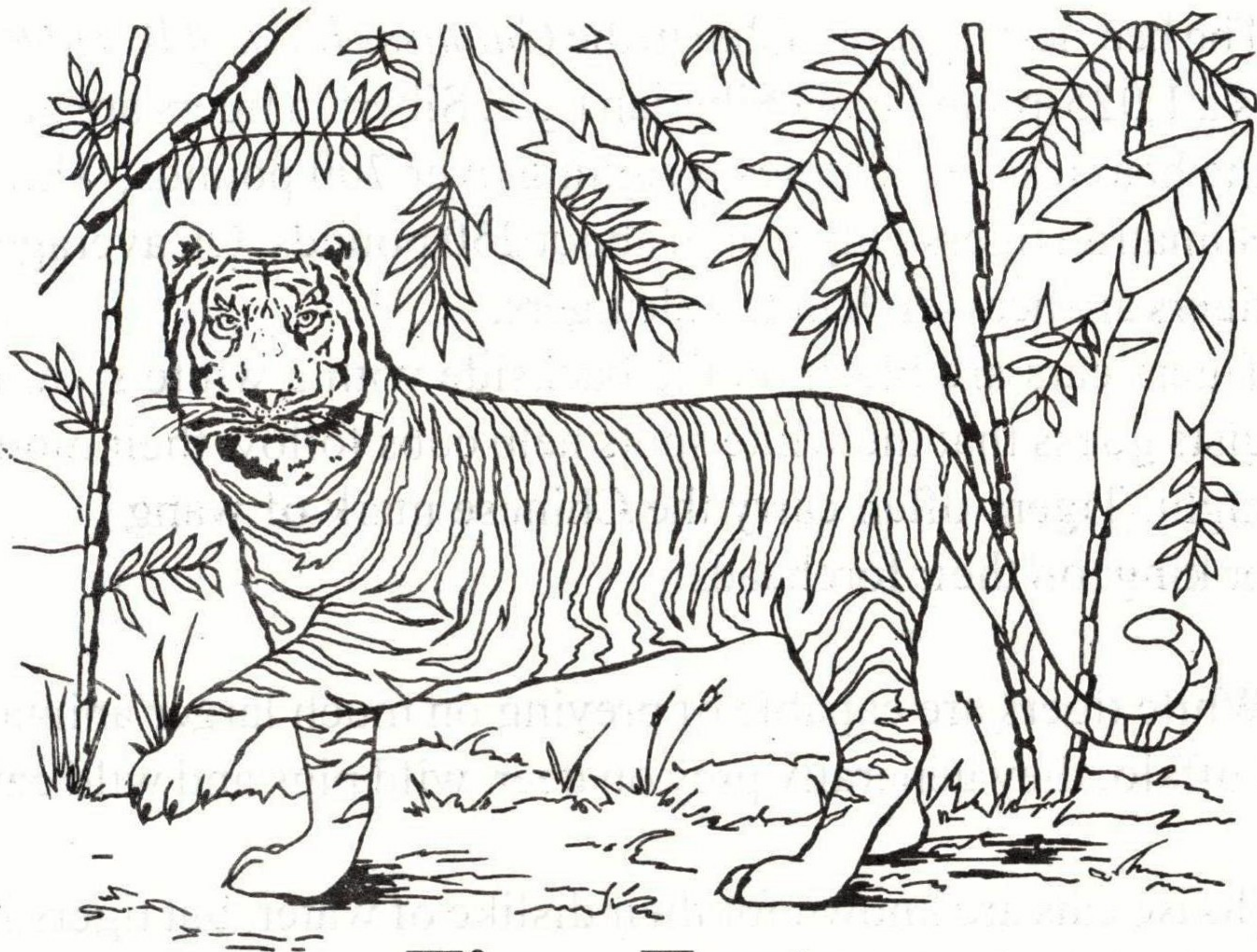
3. हाथी सूखी हुई नदियों को खोद कर, अपने साथ-साथ अन्य जन्तुओं को भी पानी उपलब्ध कराता है। इसके अतिरिक्त उनके भारी पदचिन्हों से बने गड्ढों में वर्षा का पानी भर जाता है जो अन्य छोटे-छोटे जन्तुओं के लिए पानी के स्रोत का काम करते हैं।

4. हाथी अपने मल द्वारा बीज वितरण (dispersal) में सहायक होता है। गुब रैले (Beetles) व दीमक इन बीजों को जमीन के अन्दर ले जाकर, मिट्टी को बीजों के पोषक तत्व उपलब्ध कराती है।

5. हाथी का परिवार जहाँ से भी गुजरता है, वहाँ पक्षियों के लिए भोजन का प्रबन्ध हो जाता है, अर्थात् हाथियों के जाने के कारण मिट्टी व पेड़ पौधे हिल जाते हैं जिसके कारण जीव जन्तु अपने घरों से निकल जाते हैं और पक्षी उन्हें खा जाते हैं।

6. हाथी के गोबर से पैचीडर्म (Pachyderm) नामक कागज बनता है। पुराने कागज तथा हाथी का गोबर डाल कर यह कागज तैयार किया जाता है। इस कागज से कम दाम के ग्रीटिंग कार्ड, फोटो एलबम आदि बनते हैं। यह कागज श्रीलंका में बनाया जाता है।

इतने प्रभावशाली हैं हाथी फिर इन्हें मारना नहीं, बचाना चाहिए।



Tiger Facts

- ☞ Both revered and feared for its beauty and great strength, the tiger is the largest living cat on earth.
- ☞ Five of eight subspecies of tigers survive: the Siberian (or Amur) tiger, the South China tiger, the Indochinese tiger, the Sumatran tiger and the Bengal tiger.
- ☞ Today, tigers in the wild live in Eastern Russia, China, Vietnam, Cambodia, Laos, Thailand, Malaysia, Indonesia, Myanmar, Bangladesh, Bhutan, India and Nepal. In the United States and elsewhere, tigers can only be found in zoos, circuses and wildlife parks.
- ☞ Wild tigers live in a variety of rapidly shrinking habitat that range from Indonesian tropical rainforests to the dry evergreen forests of India and to the deciduous forests of Siberia.

- ☞ The heaviest tiger recorded in the *Guinness Book of World Records* is a 1,025-pound male Siberian tiger. Siberian tigers are generally the heaviest, with males weighing over 700 pounds, while male Sumatran tigers only weigh about 250 pounds. On average, male tigers are heavier than female tigers.
- ☞ Tigers ears are black on the backside with a white spot. Biologists guess that the white spots help cubs follow their mothers at night. Tigers often carry the Chinese mark of wang (____), or king, on their foreheads.
- ☞ While tigers are capable of preying on much larger animals like buffalo, they generally prey on deer, wild pigs and wild cattle.
- ☞ House cats are known for their dislike of water, but tigers love to cool off in rivers, lakes and streams.
- ☞ Tigers can eat up to 77 pounds of meat in one night - the equivalent of 300 hamburgers. Large tigers need to eat an average of 15 pounds of meat a day.
- ☞ Sadly, each year there are fewer and fewer tigers in the world. Today, it is estimated that fewer than 7,000 tigers survive in the wild. Habitat loss, loss of prey and poaching (hunted for their bones and other body parts) are largely responsible for the tiger's decline.
- ☞ Unless extraordinary conservation measures are taken, the tiger's continued existence in the wild is in serious jeopardy.

*Provided by the Save The Tiger Fund
National Fish and Wildlife Foundation
1120 Connecticut Ave., N.W. Suite 900
Washington, D.C. 20036*

Cheetal

Quarterly News

A column of quarterly news has been introduced to bring important facts about conservation of nature & natural resources to the notice of our readers at a glance. The news items pieced together from various news papers and magazines will help to bring awareness about conservation to our readers.

The readers are requested to contribute voluntarily to this column, quoting source of the news & the date of publication in that particular source

A.S. Negi

Billy Arjan Singh Awarded Padma Bhushan

Renowned tiger conservationist, Arjan Singh, was awarded the prestigious Padma Bhushan one of the highest civilian recognition of the country, for his exemplary work in the field of Wildlife conservation. To do the honors, President A.P.J Abdul Kalam worked up to Mr Singh to facilitate the award amidst thundrous applause.

Source : Panda- a W W F-India news letter, Issue 1-2006.

A Bird species found only in Nicobar Islands in Serious trouble.

The Nicobar Megapod (*Megapodius nicobariensis*), a large footed bird that builds nests on the ground found only in Nicobar Islands is in Serious trouble. 70 percent of the birds of this species have disappeared over the last 12 years, says the Wildlife Institute of India, Dehradun. Reserchers surveyed the Islands Wild life after the 2004 tsunami and compared the findings with those of a 1993-94 survey.

Source - Down to Earth, July 1 - 15, 2006

National Environment Policy (NEP) approved

The Union Cabinet recently approved the National Environmental Policy (NEP). A Policy with a holistic vision to safeguard India's ecological security was long overdue and the announcement has been greeted by the countrys environmentalists.

Source- Down & Earth, June 30, 2006.

Missing link of Evolution found

The missing link in the evolution of animals from water into land has been found into new fossils of fish with limblike fins exavated from arctic Canada. Three nearly complete specimens of a flattened, aligator like fish species dubbed Tiktaalik roseae possess the scales, fins, snout and tower jaw of a fish, but they have the ribs, neck, skull, wrists and fingerlike bones of a land animal. Scientists had to dig, the upto three - meter - long tropical version of today's Mississippi river delta when the fish was alive some 375 million years ago.

Source - Scientific American India - June 2006.

Ecological task force for sanctuaries

Powers to field commanders in Jammu and Kashmir, N-E to protect flora and fauna

Field Commanders in the Army, deployed in Jammu and Kashmir and the north-east for counter-insurgency operations, may soon be given legal powers that will authorise them to protect the flora and fauna. The legal powers, as those vested with the Chief Wildlife Wardens, will enable them to assist forest authorities in protecting wildlife.

A special ecological task force battalion will be raised to protect wildlife sanctuaries.

Keeping in mind the perceptible decline in the tiger population in the country, the Centre also proposes to raise a special force to protect the big cats. Disciplined and dedicated jawans, who retire between 35 and 40 years and have considerable experience of operating in the jungles, will be recruited. One battalion will be raised on an experimental basis to see how effective it is in checking poaching, biodegradation, denudation and theft of forest wealth.

The proposals will come up at the third meeting of the National Board for Wildlife to be held in here on June 19. Chaired by Prime Minister Manmohan Singh, the meet will discuss follow-up of recommendations of the tiger task force, including setting up a national wildlife crime bureau for conservation of important wetlands, the Red Jungle Fowl and Asiatic lions.

Government organisations such as the Railways and the Army have large landholdings. The Ministry of Environment and Forests also proposes to fund these organisations to carry out awareness programmes and ecological projects for protection and conservation of forest wealth. The meet will discuss the immediate withdrawal and purchase and supply of diclofenac to the animal husbandry and veterinary departments to save Gyps Vulture from extinction. The drug will be phased out in three months and research into viable alternative is being carried out at the Vulture Breeding Centre at Pinjore.

Source-Times of India news by Arti Dhar from New Delhi

Oldest web-spinning spider

First record of the spider family Araneidae from the Lower Cretaceous

MANCHESTER: The world's oldest orb web-spinning spider has been found, perfectly preserved in an ancient piece of amber. The spider, 2 mm long, is the oldest example of a spider to have spun the vertical orbshaped spider web found in homes and gardens.

It is between 115 and 121 million years old. For the first time, it dates the orb web-spinning spider family Araneidae back to the Lower Cretaceous period. It also confirms the orb-web as one of the oldest structures used by spiders to capture prey.

Until now, the oldest recorded orb web-spinning spider dated back to the Upper Cretaceous period (the 94-million-year-old amber).

Dr. David Penney, of the University of Manchester's School of Earth Atmospheric and Environmental Sciences, who also holds the record for unearthing the oldest spider trapped in amber (135 million years old), found the fossil in a museum in Spain.

First evidence

He said: "This find provides the first evidence that all major orbweaving families had evolved by the Lower Cretaceous period and demonstrates that this prey capture strategy was already well evolved at a time when many of a spider's natural prey like flowering plant pollinating insects did not exist."

Dr. Penney was able to identify it by examining the eye arrangement tarsal claw structure and reproductive organs.

This is the first record of the spider family Araneidae from the Lower Cretaceous and provides the first evidence that all three major orb web-spinning spider families (Araneidae, Tetragnathidae and Uloboridae) had evolved by this time.

Dr. Penney's results are contained in a paper: "Oldest true orbweaving spider (Araneae: Araneidae)," Published in the Royal Society's *Biology Letters*.

Source-Times of India News from Manchester

Whales need more protection

The 20-year-old moratorium on commercial hunting of the world's magnificent range of whale species once again faces a challenge, as the member nations of the International Whaling Commission gather at St. Kitts and Nevis in the West Indies. The annual meeting of the IWC will be held from June 16 to 20. Enlightened governments led by Australia, New Zealand, the United Kingdom, and the United States have been campaigning to raise the level of protection for whales and dolphins. Credit must go to such opinion for the transformation-in-progress of the IWC from an agency for the regulation of whaling so that the industry could develop in an orderly way to a body that has whale conservation and science on its mind. Pro-conservation countries have to contend with the challenge that will be mounted by Japan, and some nations that have IWC votes but no interests in whaling, to the moratorium on commercial whaling. The attempts to get the ban lifted under the guise of adopting a Revised Management Scheme must not succeed. For one thing, the specialised committees on conservation and science have not yet submitted their reports on key questions. The IWC is in the process of assessing the stock of several whales, such as the Antarctic minke, the western north Pacific common minke, the southern hemisphere humpback, the blue, bowhead, right and gray whales - all of them endangered. It is deplorable that Japan continues to flout the ban, using a loophole that permits killing for scientific experiments. Norway and Iceland have also killed whales, going against the voluntary moratorium.

Despite their breathtaking size, gentle behaviour, and exceptional intelligence, whales can remain vague in the public imagination because of their isolated habitat. Yet the stranding of a juvenile northern bottlenose whale in the Thames in London some months ago led to an outpouring of affection and conservation-minded concern, which turned into grief at its death. This heart-warming Thoreauvian response reflects a realisation among people everywhere that humanity must protect flora and fauna from unsustainable pressures through binding conventions and

treaties. Identifying safe, whale-protecting lanes for ocean-going vessels should be a priority area for the IWC; it is deeply distressing that many fin, right, sperm, and hump-back whales among a total of 21 species have perished in ship strikes in recent years. The U.S. and Canada actively bind the shipping industry by law to protect whales by prescribing navigation rules and procedures in their waters - a model eminently worth adopting everywhere. It would also help if all countries supported the proposals put forth by Australia, New Zealand, Brazil, and Argentina to establish sanctuaries in the south Pacific and south Atlantic. India has a history of supporting cetacean conservation and it must contribute actively at St. Kitts to strengthen the IWC agenda on preservation.

Source- Hindu

Govt finally wakes up to save red jungle fowl

New Delhi: The wild Red Jungle Fowl, the ancestor of all domestic poultry, has started to disappear from the country. And fearing its extinction, the government has decided to undertake the first national survey to identify the exact number of pure Red Jungle Fowl (RJF) still alive and then launch a management and conservation plan to protect the birds.

Known to be resistant to all diseases that affect poultry and high on medicinal and nutritional worth being rich in minerals such as copper and iron, RJF was referred to by Charles Darwin as the original chicken from which all domestic poultry descended. But scientists say the pure RJF is highly endangered and is being replaced by genetically mixed jungle fowl.

Funded by the Wildlife Institute of India, the survey will initially be for two years and cost nearly Rs 15 lakh. The team will be headed by WII's Sathya Kumar and include experts from the Wildlife Trust of India and Delhi University. Over 15 birds from each state will be captured, their hair, blood and tissue samples taken and then matched to the genetic make-up of their ancestors in order to identify whether they are pure wild RJFs or the mixed variety.

According to WII director P R Sinha, genetically pure RJF will help scientists conduct research to find ways of making domestic poultry immune to avian diseases.

The institute has already received permission from most states to conduct the survey. Sinha said the survey will start from Himachal Pradesh, North-East, Bihar, West Bengal, Jharkhand to finally reach Rajasthan.

"The survey will be conducted in collaboration with the Central Avian Research Institute. Chief wildlife wardens of most states have given us permission to capture RJFs to take blood samples for testing. Genetic analysis alone will prove their purity," Sinha said. WII's research coordinator K Shankar added: "The decision to undertake the survey was taken at the recently concluded National Board for Wildlife Meeting held under the chairmanship of PM Manmohan Singh. The board was very keen to initiate action for better conservation of the RJF. But to launch a conservation programme, it is important to know exactly how many and in which parts of India are the pure RJFs still alive."

He said: "We had given a proposal for a five-year survey. But the ministry of environment and forests has asked us to complete it in two years following which the conservation programmes will be implemented."

RJF is one of the four jungle fowls found in India. RJF is distinct in its appearance. Its strikingly colourful plumes and a majestic red comb gives it a regal appearance. What makes it unique is the eclipse plumage, now used to identify the bird.

Source-Times of India New Delhi dated 29 June 06

11 tiger reserves have lost forest cover

Forest cover remains unchanged in 12 reserves, increases in 5

There has been a decrease in forest cover in 11 of the 28 tiger reserves in the country while 5 reserves have shown an increase in the same.

The forest cover in the remaining 12 has remained unchanged, according to a report brought out by the Forest Survey of India and Directorate of Project Tiger.

Titled "Forest Cover in Tiger Reserves of India - Status and Changes," the report says that moderately dense forest has decreased by 251 square kilometres while very dense and open forests in these reserves have shown an increase of 33 sq km and 124 sq km respectively between 1997 and 2002.

The major loss in forest cover has occurred in Nameri, Buxa, Manas, Indravati and Dampa Tiger Reserves, primarily due to socio-economic reasons and natural disasters.

Forest cover in the outer surround (10 km radial distance from the periphery) has decreased in 21 tiger reserves, increased in 2 reserves and is unchanged in five.

The total forest cover in the outer surround of the 28 tiger reserves has decreased by 124 sq km. according to the report.

The decrease in forest cover has been significant in Nameri, Buxa, Indravati, Manas and Dampa (45 sq km., 22 sq km, 11 sq km, 11 sq km and 7 sq km respectively) while the remaining six have shown a marginal decrease of 1 to 4 sq km only.

These include Bandipur-Na-garhole, Dudhwa-Katarniaghat, Kanha, Pakhui, Palamu and Sunderbans.

Source- Hindu, New Delhi dated 11 July 06

Important Notice

Due to increase in printing charges of the Society's Journal, Cheetal, which is supplied free to all categories of members, we are compelled to enhance the membership fee of the Wildlife Preservation Society as under.

Kind of member	Revised membership fee (In Rupees)
Life member	2500/-
Institutional member	400/- per year or 3500/- for life.
Annual member	250/- per year.
Student member	100/- per year.

The revised fee will be applicable to new members with immediate affect. For existing annual members of all kind it will be applicable from 1-4-2007.

All members are entitled to a free copy of our Quarterly Journal - Cheetal.

The inconvenience caused is highly regretted.

The Wildlife Preservation Society of India

1. The aims and objects of the Society are as follows :-

- (a) To promote interest and impart knowledge regarding the preservation and conservation of all forms of wildlife, particularly among the youth of the country.
- (b) To cooperate with the Govt. of India and State Governments and with others Societies and Institutions having similar aims and objects in working for the interests of wildlife.
- (c) To assist in enforcing and actively supporting the Forests Acts. Wild Birds and animals Protections Acts and Rules etc. of State Governments and the Indian Arms Act and Rules in so far as they pertain to wildlife and to bring to the notice of the authorities any infringement of the same and to assist in the detention and prosecution of offenders in respect of such laws.
- (d) To advise and help the Govt. and wildlife administrators in the formation, maintenance and protection of Sanctuaries and National Parks, preservation of wildlife in general and endangered species of India in particular and in the introduction of exotic species into the country, rehabilitation of endangered species etc. and in the formulation and amendments of rules and acts, so as to conserve and increase wildlife stocks.
- (e) To raise funds for carrying out the above aims and objects and to found and maintain museums reading rooms and libraries of natural history in order to disseminate knowledge regarding wildlife.
- (f) To carry out publicity and propaganda for the preservation of wildlife in India by means of monographs, journals, films, filmstrips and other feasible methods.
- (g) To assist members of the Society in obtaining facilities for viewing and photographing wildlife in India.
- (h) To conduct research into the problem of Wildlife management in India, and in pursuance of this, to initiate, encourage and, where possible assist in the projects of the study of threatened species and related objects and to provide reference and research facilities for such work.
- (i) To carry on such other activities which will serve the above subjects.

2. What membership of Wildlife Preservation Society of India will entitle you to ?

- (1) You will become an active member of the growing group of Wildlife enthusiasts, who enjoy working for and spreading the knowledge of how to conserve India's heritage of wildlife for posterity.
- (2) You will be entitled to the full use of the library of the Wildlife Preservation Society and of its reading room.
- (3) You will receive a membership certificate.
- (4) You will receive a personal Identification and Membership Card.
- (5) You will be entitled to buy all publications of the Society at a concessional rate.
- (6) You will be entitled to buy at concessional rates the Societies Greeting Cards, Calendars. Tie, Label badges and the Balance of Nature Game (specially Published in colour for its educative and recreational values).
- (7) You will be supplied "Cheetal", the quarterly journal of the society free.

3. For membership particulars write to Honorary Secretary, Wildlife Preservation Society of India 7 Astley Hall, Dehra Dun.

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